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(71) Applicant *(for all designated States except US)*: SOCOA INTERNATIONAL HOLDING S.A. [LU/LU]; 11A, boulevard Prince Henri, L–Luxembourg (LU).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: DIJKSTRA, Johannes [NL/NL]; Kennedy Boulevard 640, NL–1931 XM Egmond aan Zee (NL).

(74) Agent: LAND, Addick, Adrianus, Gosling; Arnold & Siedsma, Sweelinckplein 1, NL–2517 GK The Hague (NL).

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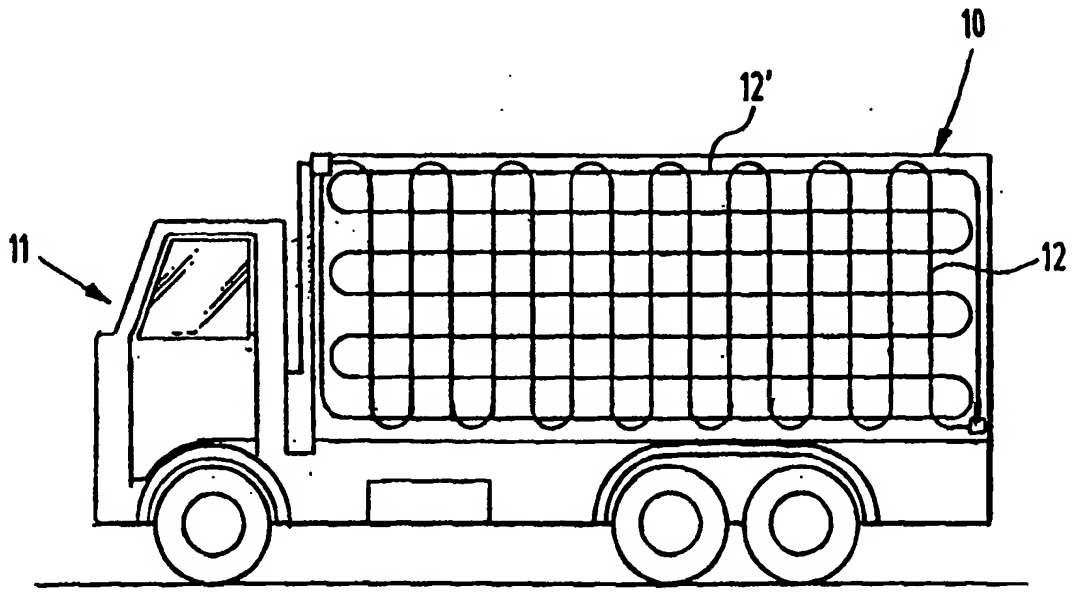

(57) Abstract

Security system, comprising: a transmitter for transmitting radiation in a wavelength range in the order of magnitude of about 630–660 nm; a cable permeable to the radiation which is connected to the transmitter and has a thickness in the order of magnitude of 0.5–1 mm; and a receiver for receiving the radiation passed through the cable, which is connected to the cable; and means for adjusting the degree of sensitivity of the cable.

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SECURITY SYSTEM AND METHOD FOR USING SUCH SECURITY SYSTEM

It is known to equip security systems with cables or wires through which radiation is passed and wherein pressing-in or severing of the cable is detected and an alarm is subsequently set into operation.

Such a known security system is for instance described in the American patent specification 4.618.764. In this known system a metallic wire is wound round the optical fibre to increase the sensitivity of the optical cable. The tightness of winding of this metallic wire will affect the sensitivity, which has an adverse effect on production and/or application options.

The present invention provides a security system, comprising:

- a transmitter for transmitting radiation in a wavelength range in the order of magnitude of about 630 nm or of about 630-660 nm;
- a cable permeable to radiation which is connected to the transmitter and has a thickness in the order of magnitude of 0.5-1 mm; and
- a receiver for receiving the radiation passed through the cable, which is connected to the cable; and
- means for adjusting the degree of sensitivity of the cable.

With the system according to the present invention a plurality of applications becomes possible, since the cable is very sensitive and the sensitivity can be adjusted, for instance in that the receiver is provided with an attenuator, or by adapting the material and thickness of the sheathing. In contrast to the prior art systems, the degree of sensitivity can also be adjusted by arranging an optical cable in or round material, for instance rubber. This increases

manufacturing options, while owing to the soft material the sensitivity is less dependent on the force with which weaving or winding takes place.

Methods according to the present invention relate for instance to securing a cover flap of a truck, sails, nets (such as used for covering freight etc.), other valuable objects, such as works of art, clothing, audio and video equipment, cycles and mopeds, motorcycles, pneumatic dispatch, feeder cables for electric power supply, cables for lightning conductors, and to registering the stability of dikes and banks, for detecting breaches in dikes and for dredging operations and so on.

An important application is likewise that of equipment for weighing, control and/or measuring purposes and the like. Further applications relate to securing land, fences and arms, so-called projections, which may or may not be movable. The barbed wire fixed at the top of these projections can also be secured, as well as barbed wire in general such as situated in fencing or in rolls which are subsequently unrolled round objects for protection purposes. So-called constantin/NATO wire, which is wire with sharp blades attached thereto, can also be secured in this manner.

So-called parking brackets, for instance in a showroom or display window of a garage, wherein a number of parking brackets mutually connected via an optical cable can be secured. The cable according to the present invention can further be used in so-called contact mats, which are for instance made to size and can be arranged round objects for security purposes; for instance on or under grass, tiles, sand, gravel etc., or in front of doors, as doormat, or on the inside or outside of shop fronts, either below ground or not. These so-called contact mats can also be arranged on top of walls to prevent their being climbed over etc.; as well as being arranged on roofs, balconies and terraces, either visibly or not under tiles or roofing material. In addition,

these mats can be used as detecting system at pedestrian crossings, so-called zebra crossings, but also in interlocking chambers in banks, where a so-called combi-mat can be installed consisting of a mat with a second mat inside, both of which are connected to a separate module with an integrated processor. When someone steps for instance on the inner mat a signal is generated. When a second person, for instance an intruder, steps onto the outer mat within a pre-determined number of seconds, a signal is generated and the door of for instance the safe will remain closed. The mats can also be rolled/placed temporarily round objects. They can also find application as rubber sheet in hospitals and institutions.

If no cable cladding is used, a cable which is transparent or sprayed white can be used to secure windows and so on, irrespective of whether these consist of glass or plastic (such as for instance Lexan).

The cable can also be used on walls, arranged if desired beneath plaster or wallpaper, on sheet piling profiles or around vaults, as well as in safe and vault doors, or safe and vault walls. In sliding gates (including so-called speed gates, revolving doors, movable fences, overhead and high-speed doors (consisting inter alia of a flexible type of vinyl) an optical cable can be used which is incorporated in a flexible rubber hose, or in a profile/frame (so-called rubber sensors). Said flexible rubber hoses, frames/profiles (rubber sensors) are not limited to a single form but can take a plurality of forms, such as round (with or without a flattened underside), oval, triangular, with or without protruding lip and so on.

Application is also possible in so-called cold store doors, double-walled (of inter alia a flexible type of vinyl) high-speed doors - provided with a rolling-up mechanism - through which hot air flows -, for instance to replace so-called tape-switch and the like. Particularly in overhead, high-speed and cold store doors the cable can also be used as break-away safety. This may or

may not be combined with a safety edge. In the case of break-away safety the cable is situated, more or less enclosed, on one or two sides of the flexible door in a slightly round form. If the flexible door is rammed out of its frame, a signal then results, the so-called break-away safety. Said safety edge lends itself in excellent manner for use close to the underside of garage doors.

The above mentioned door security means relating to the opening and/or closing of the relevant doors and/or detection of break-away can be combined with physical security of the door itself by leading the cable through or along the door, or by fixing or sealing it on the vinyl or feeding it through the windows in the door.

The present invention will be further elucidated on the basis of the following description of a number of preferred embodiments thereof, wherein reference is made to the annexed drawings, in which:

fig. 1 shows a graph of a preferred embodiment of a fibre and/or security system used in the present invention;

fig. 2 shows a side-view of a method for securing a truck;

fig. 3 is a view elucidating a method for securing an overhead door;

fig. 4 shows a view in perspective of a clip such as is used in fixing a fibre on the wall of glasshouses and/or on sheet piling profiles etc.;

fig. 5 shows a side-view of an application of a system according to the present invention;

fig. 6 shows a view respectively of a further application of the device according to the present invention;

fig. 7-11 show graphs of the attenuation at different diameters of an optical fibre as a function of the wavelength;

fig. 12 shows a perspective view of a preferred embodiment of a so-called Stand-Alone-Unit to which one

or more cables can be connected hanging as well as standing for the purpose of securing various aspects;

fig. 13 is a view of a preferred embodiment of a housing with a transformer and two light modules therein;

fig. 14 and 15 show views elucidating a method for securing a fence;

fig. 16 shows a view elucidating a method for interweaving a cable into a so-called wire fence;

fig. 17 shows a drawing of a connection diagram;

fig. 18 is a view elucidating the method for securing a movable projection/extension;

fig. 19 is a view elucidating the method of a fence or sliding gate security, wherein the cable is inserted in the bars and as such functions as detecting sensor in the case of climbing, sawing through and/or bending of the bars;

fig. 20 shows a view elucidating a method for securing security bars and (ornamental) fencing, wherein the cable is inserted in the security bars or in the (ornamental) fencing;

fig. 21 shows a view elucidating a method for securing a contact mat;

fig. 22 shows a view in perspective of a building having contact mats arranged therearound for security;

fig. 23 shows a perspective view of a wall, the top side of which is secured with a strip-like contact mat;

fig. 24 shows a view in perspective of a security method for securing tiles, for instance in the case of balconies and terraces;

fig. 25 shows a view in perspective elucidating the method for securing all possible objects;

fig. 26 shows a view in perspective elucidating the method for securing all possible machines or conveyor belts;

fig. 27 shows a view in perspective elucidating the method for securing a fence with vertical profile/frame;

fig. 28 shows a view elucidating a method for securing an overhead or high-speed door;

fig. 29 is a view in perspective elucidating the method for securing glasshouses and the like;

fig. 30 shows a side-view of a method for securing doors, door-frames, windows and window-frames;

fig. 31 is a view in perspective elucidating a method for securing barbed or constantin wire;

fig. 32 is a view in perspective elucidating the method for securing pneumatic dispatch systems, cable ducts, lines of lightning conductor installations etc;

fig. 33 and 34 show a view in perspective elucidating the method for securing truck cover flaps;

fig. 35 is a side-view of the method for securing a painting or other hanging object;

fig. 36 shows a view of a preferred embodiment of an inner hose arranged in a rubber impact strip;

fig. 37 shows a view of a preferred embodiment of a mat; and

fig. 38 shows a view of a watertight stainless steel column with slidably closable cover.

In the present invention light is sent by a transmitter, for instance an LED (Light Emitting Diode) with a power of about 6 mW to 20 mW or 500-4000 med (millicandelas) over a distance of 100-300 m to a receiver through a fibre of glass or plastic material, such as PMMA (polymethyl methacrylate) with a thickness of 0.3 - 0.8 mm (order of magnitude 0.5 - 1.5 mm). In a glass fibre cable a typical length amounts to 300 - 400 m, over which length sufficient light energy can be sent to the receiver by the transmitter, while this could amount to about 100 - 200 m for a plastic cable.

A preferred embodiment of the applied cable has a core diameter of 100 nm (0.1 mm) and a cladding diameter of 140 nm and a stepped refractive index

profile. The coating was composed of polyimide. The attenuation at 800 nm amounted to 4.3 dB per kilometre, wherein it is noted that a usable spectral range can extend between 180 and 2400 nm.

A graph of this preferred embodiment of the attenuation A plotted against the applied force in Newton (N) is shown in fig. 1.

In other preferred embodiments (not shown) of a cable for a system according to the present invention, the cable can have a sheath of polyethylene or other plastic, such as polyvinyl chloride (PVC). What is important is that the cable has a sufficient sensitivity over a sufficient length. Sensitivity is also determined by the stiffness or resilience of the material of the cladding.

A non-sheathed cable can for instance be used by incorporating it in glass or transparent plastic, to be used for the securing of windows and doors. A polyethylene sheath with a thickness of 0.5 to 2.2 mm can be used in securing a green- or glasshouse, a dam wall and/or overhead doors and so-called high-speed doors. Cables with such a sheath are also used with or between rubber hoses, profiles and frames, whereby these acquire optimum damping. Silicone as well as cellular rubber hoses can preferably be used as inner hose. This cable is also incorporated in the wall of rubber, PVC and/or plastic hoses. The cable then runs in single, double or triple form in parallel or spiralled along the hose. There is also an embodiment wherein the cable is enclosed between both walls of two hoses which have been pulled one over the other. This hose can serve for detection as well as for passage of liquids.

Cables with thicker sheath, such as a polyethylene sheath of 3.5 mm are for instance used in securing fences (and projections) and the like. The sensitivity of the cable depends on the type of sheath and the thickness of the sheath.

With a cable according to the present invention a plurality of applications can be envisaged.

A first preferred method relates to the use in securing a fence, wherein a light-transmitting cable is woven therethrough, for instance by weaving it alternately above and below intersections of wires of the fence lying in one line.

Use can herein be made of a housing extending parallel to the fence posts to accommodate the light modules and the like.

Another preferred method for use of the present invention is shown in fig. 2, wherein a cover flap 10 of a truck 11 is provided with a number of interwoven cables 12, 12' which are connected in a manner not shown to respectively transmitters and receivers. As is known, valuable cargo is increasingly being stolen from non-secured trucks. The shown application of the system according to the present invention prevents such theft.

As has been discussed with respect to the system according to the present invention, adjustment of the sensitivity of the exerted force at which the alarm comes into operation is possible, on the one hand due to the chosen sensitivity of the cable and on the other due to the attenuation options of the receiver. This enables many further applications in addition to the above stated two uses, such as the arranging of cables in a dike body or the arranging of one or more cables arranged in rubber in sliding doors or sliding gates, as well as in the ground in the form of a mat, which can also be used as such as switch mat or as loop for all possible interconnections round a valuable object, such as a work of art. It is also conceivable to apply the optical cable according to the present invention in a corset for back correction wherein, when the back deviates from the correct position, pressing-in of the fibre takes place whereby a warning can be given.

Further applications relate for instance to the arranging of such cables in the ground in mat form, the

arranging of one or more optical cables round cable ducts or round one or more copper rods for lightning conduction and power supply to heavy hoisting and harbour cranes and the like, which are being stolen more and more frequently, in addition to the securing of pneumatic dispatch tubes, door and window rabbets, balustrades and mats which can be laid on the floor or ground.

For securing for instance glass walls in a greenhouse for plants, a special clip 20 (fig. 3) has been designed for guiding a glass fibre cable (not shown) in a holder part 21. The dimensions of such a clip amount to for instance 30 x 17 x 0.5 mm.

A further application relates to a door, constructed for instance from plastic, in which a cable 31 according to the present invention is arranged which, when incorporated in a rubber impact frame close to a bottom end 32, can also serve to determine whether the door is opened or closed, which is important for the schematically designated rolling-up mechanism 33. In similar manner a cold store door, garage door or high-speed door can be secured, whether or not in combination with a so-called break-away safety, with or without safety edge. Use of this safety edge is not limited to the above described but can extend to all types of security applications, such as for instance a safety edge on all kinds of machines and tools and/or industrial robots and/or automatically controlled vehicles (for instance for international transport purposes etc.).

In a further preferred embodiment (fig. 5) a number of optical fibres 51, 52, 53 are arranged in a mat 54, for instance vulcanized therein, whereby the presence of a person is detected when a foot F presses thereon. Such mats can for instance be arranged under tiles, at doors and/or on the inside of shop fronts. The cable is herein arranged in nets in order to obtain the pressure points which enhance sensitivity.

A further preferred embodiment for such a security (fig. 6), for instance for flat roofs and

balconies and the like, comprises tubular rubber profiles 61 in which are received optical fibres 62. When the system is used as dike and embankment stability detection, a so-called buckle cable can also be used in addition to the above mentioned cables. Arranged here round the inner cable of preferably 2.2 or 3.5 mm diameter and free of this inner cable is a rather stiff cladding, which "buckles" in the case of too much change in tension and therefore generates a signal. Tiles 63 rest on rubber blocks 64, whereby, when the tile is walked on, the rubber profiles 61 are also depressed and presence can be detected.

In addition to above mentioned integrated systems the present invention can be embodied as "stand alone" system and can be provided with special processor means, for instance for detecting false alarm and for counting event/incident alarms. In addition to the above mentioned integrated systems the present invention can be embodied with and/or provided with a specially prepared receiver/transmitter module and/or processor(s), so that the system can be used as weighing, measuring, controlling, detection, testing and rescue equipment. For instance for weighing trucks, freight, goods and ship's cargo, but also for measuring differences (or stress) in for instance concrete constructions, such as bridges and/or tunnels.

A non-sheathed cable can for instance be applied by incorporating it in glass or transparent plastic to be used for securing windows and doors. A polyethylene sheath with a preferred thickness of 0.5 to 2.2 mm can be used for securing so-called horticultural greenhouses/ glasshouses. As well as dam walls and for securing window and door frames, contact mats and break-away safety and most of the previously stated applications. Cables with such a sheath are also used in the rubber hoses, profiles and frames wherein this encased cable is spiralled round an inner hose to obtain optimum pressure and thereby optimum damping. In this

type of application and also for instance in pressure mats can be employed receivers which generate a static signal as well as receivers which generate a non-static signal. Silicone as well as cellular rubber hose can preferably be used as inner hose, this list not being exhaustive. This cable is also used incorporated in the wall of rubber, PVC and/or plastic hoses. The cable then runs in single, double or triple form in parallel or spiralled along the hose. There is also an embodiment wherein the cable is enclosed between both walls of two hoses pulled one over the other. This hose can serve for detection as well as for passage of liquids.

Cable with thicker sheath, such as polyethylene sheath of 3.2 mm or a combination of PVC sheath with a polyethylene cladding thereover, is preferably used for fencing and projections, pneumatic dispatch and securing lightning conductor installations and the like. In the latter case the cable is preferably fixed on the (copper or aluminium) line by means of pressure saddles. Alternative fixing options are glue or tie-wraps. A cable with a sheath of 2.5 mm PVC is slightly more sensitive than a cable with a sheath of polyethylene. This latter cable can also be used well for the contact mats. For the securing of barbed wire/constantin wire a flat cable is preferably used with integrated power supply. This power supply cable can for instance consist of a plurality of woven, thin copper threads in order to obtain as robust a cable as possible. This cable can optionally also be strengthened with a plastic, preferably Kevlar. This by having one or more threads of Kevlar run parallel to the cable and integrated in the cladding. Or by providing the cable with a woven construction of Kevlar. If desired, the whole cladding can also be constructed from Kevlar.

A further application relates to making rubber sensors in the form of profiles, frames or hoses of all possible shapes wherein a light-transmitting cable is woven round an inner hose and inserted into the rubber profiles as shown inter alia in fig. 24, 26, 27 and 28.

Another preferred method of applying the present invention is shown in fig. 21, wherein a cable is woven through a web, whereafter the top and bottom sides are closed, sealed or glued in watertight manner. Optionally arranged therein between the mesh of the net are holes for allowing passage of rain water etc. These mats can also be used in beds in for instance hospitals and institutions etc., in order to indicate whether a patient or elderly person has left their bed.

Another application for these mats or for the safety edges is for parking purposes. If these mats are arranged in the ground and connected to a central control room, parking attendants can see exactly, for instance on a graphic display, where cars are parked incorrectly.

Another preferred method (fig. 14, 15, 16 and 20) relates to the use in securing a fence (with or without projection security), wherein a light-transmitting cable is woven through the fence and/or projections, for instance by weaving alternately above and below intersections of wires of the fence lying in one line.

Another interesting preferred method for use of the present invention is shown in fig. 33 and 34, wherein a cover flap of a truck is provided with a number of interwoven cables which are connected in a manner not shown to respectively transmitters and receivers. As is known, valuable cargo is increasingly being stolen from non-secured trucks. The shown application of the system according to the present invention prevents such theft. In accordance with the same principle, separate tarpaulins can be made which can be placed over objects or goods to be safeguarded. These may or may not be equipped with a mobile transmitting installation and accumulators, batteries or solar panels. In the same manner vinyl/plastic high-speed doors can also be secured (fig. 28) either in combination with safety edge and break-away safety or not.

A further preferred method of applying the present invention is shown in fig. 32. The cable is herein laid round or parallel to pneumatic dispatch tubes or rods or lines/power supply cables etc., in order to prevent break-in into the tubes or theft of hoses or pipes/power supply cables etc. Fixing preferably takes place by means of tie-wraps but can also be carried out using glue etc.

As discussed with respect to the system according to the present invention, adjustment of the sensitivity of the exerted force at which the alarm comes into operation is possible, on the one hand due to the chosen sensitivity of the cable and on the other due to the attenuation options of the receiver. This enables many further applications in addition to the above mentioned six preferred applications, such as arrangement of cables in the ground or in a dike body which may or may not be in mat form or incorporated as above in a tarpaulin or in rubber profiles. In this use the cables can also be provided with a moisture-recording cladding. In addition, it is conceivable to apply the optical cable according to the present invention in a corset for back correction, wherein, when the back deviates from the correct position, pressing-in of the fibre takes place whereby a warning can be given.

For the securing of for instance glass walls in a greenhouse for plants, dam wall profiles or other walls with a smooth surface, a special clip (fig. 16) has been designed for guiding a glass fibre cable (not shown) in a holder part. The dimensions of such a clip amount for instance to 30 x 17 x 0.5 mm.

A further preferred embodiment for securing terraces, balconies and the like (fig. 21 but particularly fig. 22) comprises tubular rubber profiles in which, as described above, optical fibres are received. Tiles preferably rest here on rubber blocks, whereby, when the tiles are walked on, the rubber profiles 20 are depressed (slightly) and presence can be detected.

For the securing of cars etc., use can be made of the above mentioned Stand-Alone-Unit which is connected to the 12 or 24 V battery of the car, for instance by means of the cigarette lighter. A contact mat in the form of a seat covering or simply as mat is subsequently arranged in the car. Sirens or lamps can be connected to the Stand-Alone-Unit. In the case of unauthorized entry of the vehicle a signal is created which, if desired, can also be passed on by means of telephone, radiophone or other methods of communication. The use of the system in the above described manner in cars can of course also serve in taxis as passenger detection systems. In similar manner, undesired or premature opening of an air-bag can be prevented. If no-one is sitting in or on the seat, or no pressure is being exerted on the foot-mat, the air-bag will then not open spontaneously in the event of a collision.

In addition to the above mentioned integrated systems, the present invention can be embodied as "stand alone" system, and/or be provided with special processor means in order to enable adjustment of for instance the length and number of pulses, this to prevent unwanted detection.

The present invention is not limited to the above described preferred embodiments thereof; the rights applied for are defined by the following claims.

CLAIMS

1. Security system, comprising:

- a transmitter for transmitting radiation in a wavelength range in the order of magnitude of 630 nm;

- a cable permeable to the radiation which is connected to the transmitter and has a thickness in the order of magnitude of 0.5-1 mm; and

- a receiver for receiving the radiation passed through the cable, which is connected to the cable; and

- means for adjusting the degree of sensitivity of the cable.

2. Security system as claimed in claim 1, wherein the transmitter transmits radiation in pulses, for instance at a pulse width of 30 seconds.

3. Security system as claimed in claim 1 or 2, wherein the cable has an attenuation of about 1.5 - 2.5 dB/N (decibels per Newton).

4. Method for securing a cover flap of a truck, wherein a security system as claimed in any of the claims 1, 2 or 3 is used.

5. Method for securing the body of a dike, wherein a security system as claimed in claim 1, 2 or 3 is used.

6. Method for securing a fence, wherein a security system as claimed in claim 1, 2 or 3 is used.

7. Method for securing a sliding door or sliding gate, wherein a security system as claimed in claim 1, 2 or 3 is used.

8. Method for securing the access to a site, wherein one or more cables in mat form of a system as claimed in claim 1, 2 or 3 are arranged in the ground.

9. Method for securing a valuable object, wherein a loop of a cable from a security system as claimed in claim 1, 2 or 3 is used.

10. Method for securing a greenhouse or glasshouse, wherein a security system as claimed in claim 1, 2 or 3 is used.

11. Method for securing a pneumatic dispatch system, wherein a security system as claimed in claim 1, 2 or 3 is used.

12. Method for securing a balustrade, wherein a security system as claimed in claim 1, 2 or 3 is used.

13. Method for securing a revolving door, wherein a security system as claimed in claim 1, 2 or 3 is used.

14. Method for securing a door or rabbet, wherein a security system as claimed in claim 1, 2 or 3 is used.

15. Method for securing a lightning conductor or a flat roof, wherein a security system as claimed in claim 1, 2 or 3 is used.

16. Method for securing a power supply cable for a hoisting or lifting crane or the like, wherein a security system as claimed in claim 1, 2 or 3 is used.

17. Method for securing a window or the like, wherein a cable of a system as claimed in claim 1, 2 or 3 is arranged between two plates of transparent material.

18. Security system as claimed in claim 1, 2 or 3, wherein the cable is arranged in a flexible profile part.

19. Security system as claimed in claim 18, wherein the profile part is in the form of a mat.

20. Security system as claimed in claim 18 or 19, wherein the flexible material is vulcanized rubber.

21. Security system as claimed in claim 1, wherein the means for adjusting the degree of sensitivity of the cable comprise an adjustable attenuator.

22. Method for securing a cover flap of a truck, wherein a security system as claimed in any of the claims 1, 2 or 3 is used.

23. Method for securing a rubber profile/frame or hose, wherein a security system as claimed in any of the claims 1, 2 or 3 is used.

24. Method for securing the surface of doors, wherein a security system as claimed in claim 1, 2 or 3 is used.

25. Method for securing safes, safe doors and safe-deposit devices, wherein a security system as claimed in claim 1, 2 or 3 is used.

26. Method for securing walls, sheet piling profiles, fencing and horticultural greenhouses (glass-houses), wherein a security system as claimed in claim 1, 2 or 3 is used.

27. Method for securing window and door frames/rabbets, wherein a security system as claimed in claim 1, 2 or 3 is used.

28. Method for securing barbed wire and/or constantin wire, wherein a security system as claimed in claim 1, 2 or 3 is used.

29. Method for securing a site or a roof wherein one or more cables, which may or may not be woven into mats, are arranged on or in the ground.

30. Method for securing a valuable object, wherein a loop of a cable from a security system as claimed in claim 1, 2 or 3 is used.

31. Method for securing a pneumatic dispatch system, wherein a security system as claimed in claim 1, 2 or 3 is used.

32. Method for securing a bar fence, ornamental wrought iron fence and security bars, wherein a security system as claimed in claim 1, 2 or 3 is used.

33. Method for securing cycle, moped or motorcycle, wherein a security system as claimed in claim 1, 2 or 3 is used.

34. Method for securing the underside of a revolving door, wherein a security system as claimed in claim 1, 2 or 3 is used.

35. Method for securing cable ducts, wherein a security system as claimed in claim 1, 2 or 3 is used.

36. Method for securing electric cables and/or feeder cable, wherein a security system as claimed in claim 1, 2 or 3 is used.

37. Method for securing lightning conductor systems or a (flat) roof, wherein a security system as claimed in claim 1, 2 or 3 is used.

38. Method for securing a window of glass or plastic, wherein a security system as claimed in claim 1, 2 or 3 is used.

39. Method for securing pedestrian crossings (zebra crossings), wherein a security system as claimed in claim 1, 2 or 3 is used.

40. Security system as claimed in claim 1, 2 or 3, wherein the cable is arranged in a flexible profile part.

41. Security system as claimed in claim 40, wherein the profile part is in the form of a mat.

42. Security system as claimed in claim 40, wherein the cable is integrated into the flexible profile wall of rubber or plastic so that this profile, this hose can also be used for the passage of liquids.

43. Security system as claimed in claim 1, 2 or 3, wherein the cable is situated between two hose walls of rubber or plastic so that this profile, this hose can also be used for the passage of liquids.

44. Method for securing tennis nets, wherein a security system as claimed in claim 1, 2 or 3 is used, wherein the cable is tensioned along the top side of the net such that detection occurs when the tennis ball contacts this net.

45. Method for securing cars etc., wherein a security system as claimed in claim 1, 2 or 3 is used wherein the cable in the form of a contact mat is laid in the car and/or on the seats such that detection occurs when the contact mat is touched, stood on or sat on,

wherein the system can be connected to the battery of the car.

46. Method for securing beds and seats in institutions, hospitals etc., wherein a security system as claimed in claim 1, 2 or 3 is used wherein the cable in the form of a contact mat is arranged on or under or around the mattress or seat.

47. Method for securing antennas etc. or other masts and the like, wherein a security system as claimed in claim 1, 2 or 3 is used as warning signal in the case of breakage, theft and the like. The cable is herein spiralled round the mast or antenna and fastened/fixed at regular distances.

48. Method for securing bank and access interlocking chambers and the like (for instance at vaults, prison institutions etc.), wherein a security system as claimed in claim 1, 2 or 3 is used. The cable is laid at the location to be secured in the form of (incorporated into) a contact mat. By means of the processor control it is possible to detect whether one or more persons are present on the relevant mat.

49. Method for securing zebra crossings/pedestrian crossings, wherein a security system as claimed in claim 1, 2 or 3 is used. The cable is herein laid in the form of a contact mat under the (possibly rubber) paving stones located in the immediate vicinity of the pedestrian-crossing lights. When the mat is stepped on, the green light is activated by means of a circuit.

50. Method for playing a so-called musical scale mat for educational purposes. For use in inter alia infant schools, children's playgrounds and in institutions for the disabled. The security system as claimed in claim 1, 2 or 3 is herein used. A plurality of cables, incorporated in a contact mat on which the keys of a piano or organ - corresponding with a note of the scale - are clearly visible, are herein laid on the ground, whereafter the mat can be played with hands or

feet by applying pressure to the correct keys. The diverse cables all correspond with different transmitter-receivers.

51. Method for securing inter alia car washes, wherein a security system as claimed in claim 1, 2 or 3 is used. The cable is herein placed in so-called contact curtains which are hung transversely in the car wash and through/along which the vehicle for washing as it were travels. The size of the contact curtains is such that at desired locations (for instance where a side mirror protrudes too far) contact is made.

52. Method for securing inter alia car washes, wherein a security system as claimed in claim 1, 2 or 3 is used. The rubber profiles/impact frames according to claim 6 are herein placed as optionally strengthened sensors protruding from the wall in order to detect protruding parts of the vehicle for washing.

53. Method for securing so-called safe-rooms, such as are encountered particularly in the chemical industry and where, due to the danger of explosion, no electrical switching may take place wherein sparks (can) occur, and wherein a security system as claimed in claim 1, 2 or 3 is used.

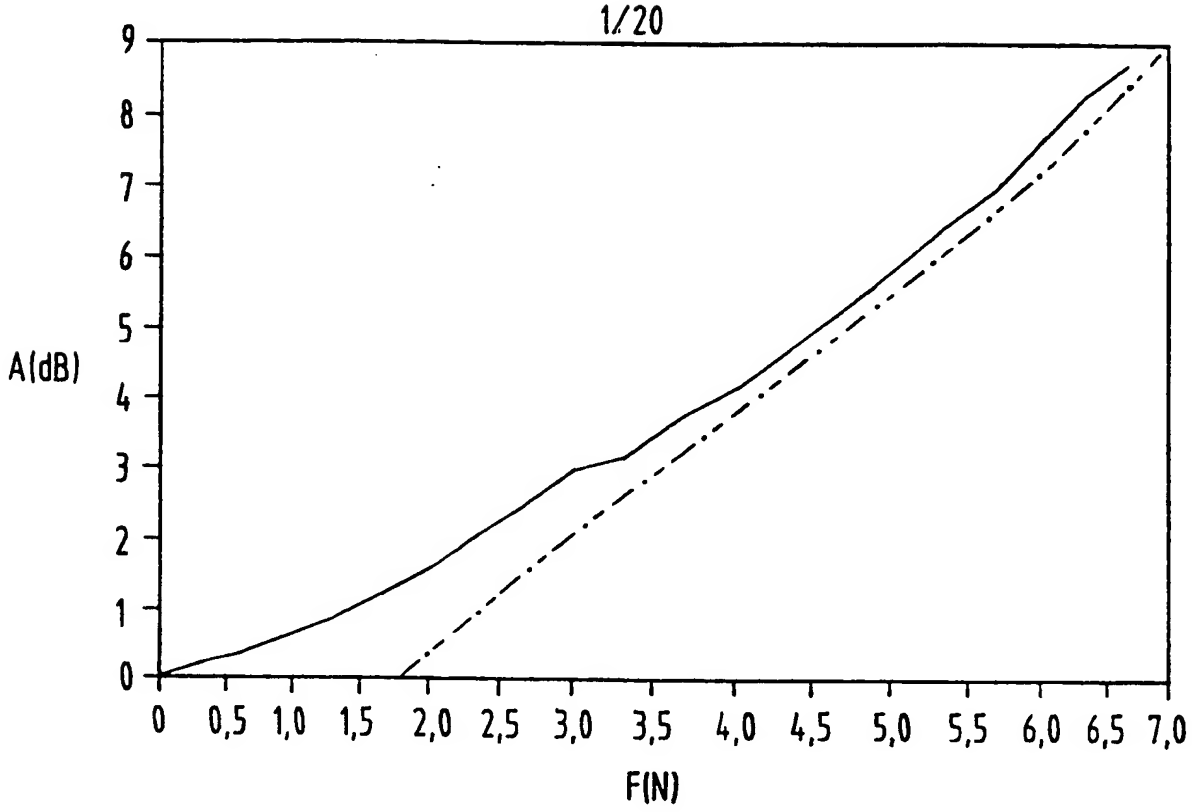
A(dB)
0
1
2
3
4
5
6
7
8
9
0 0,5 1,0 1,5 2,0 2,5 3,0 3,5 4,0 4,5 5,0 5,5 6,0 6,5 7,0
F(N)

FIG. 1

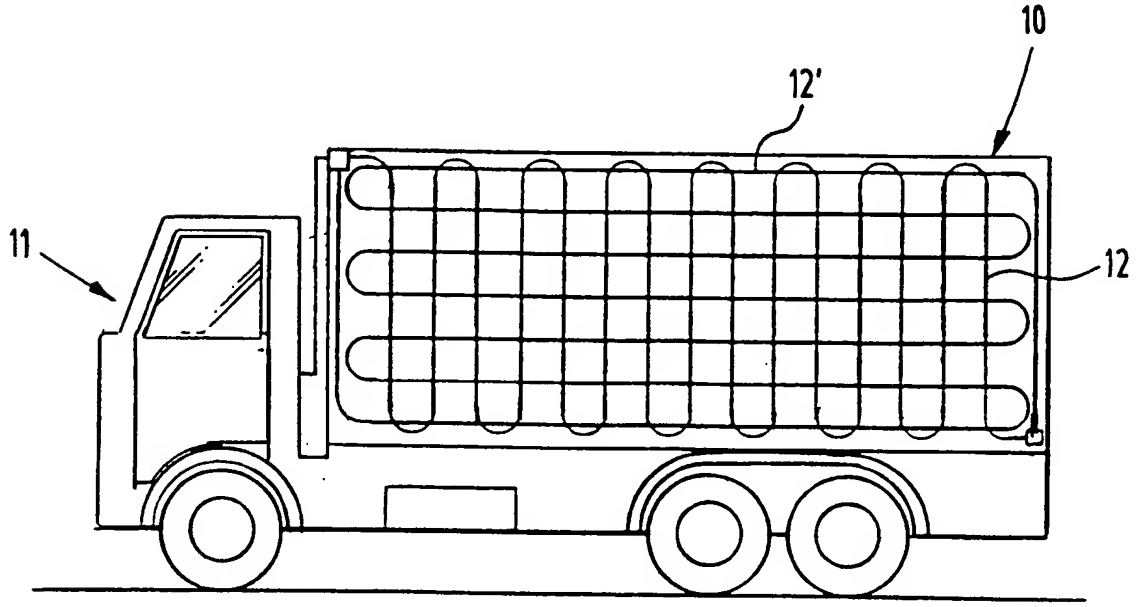
10
12'
11
12

FIG. 2

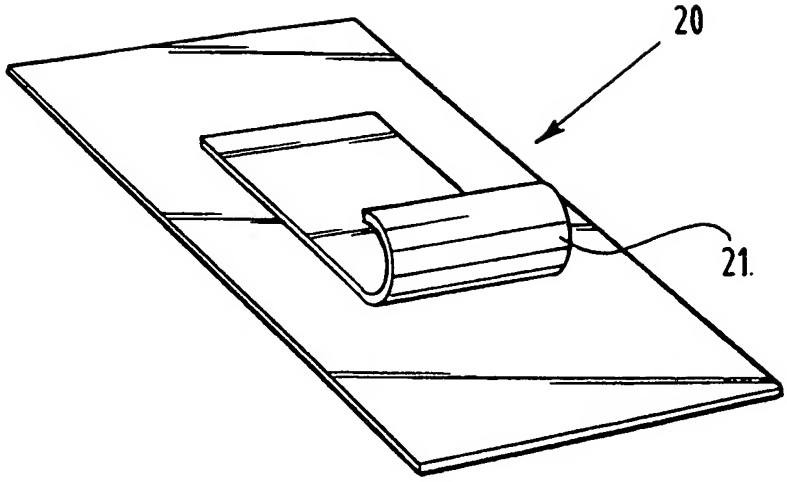

FIG. 3

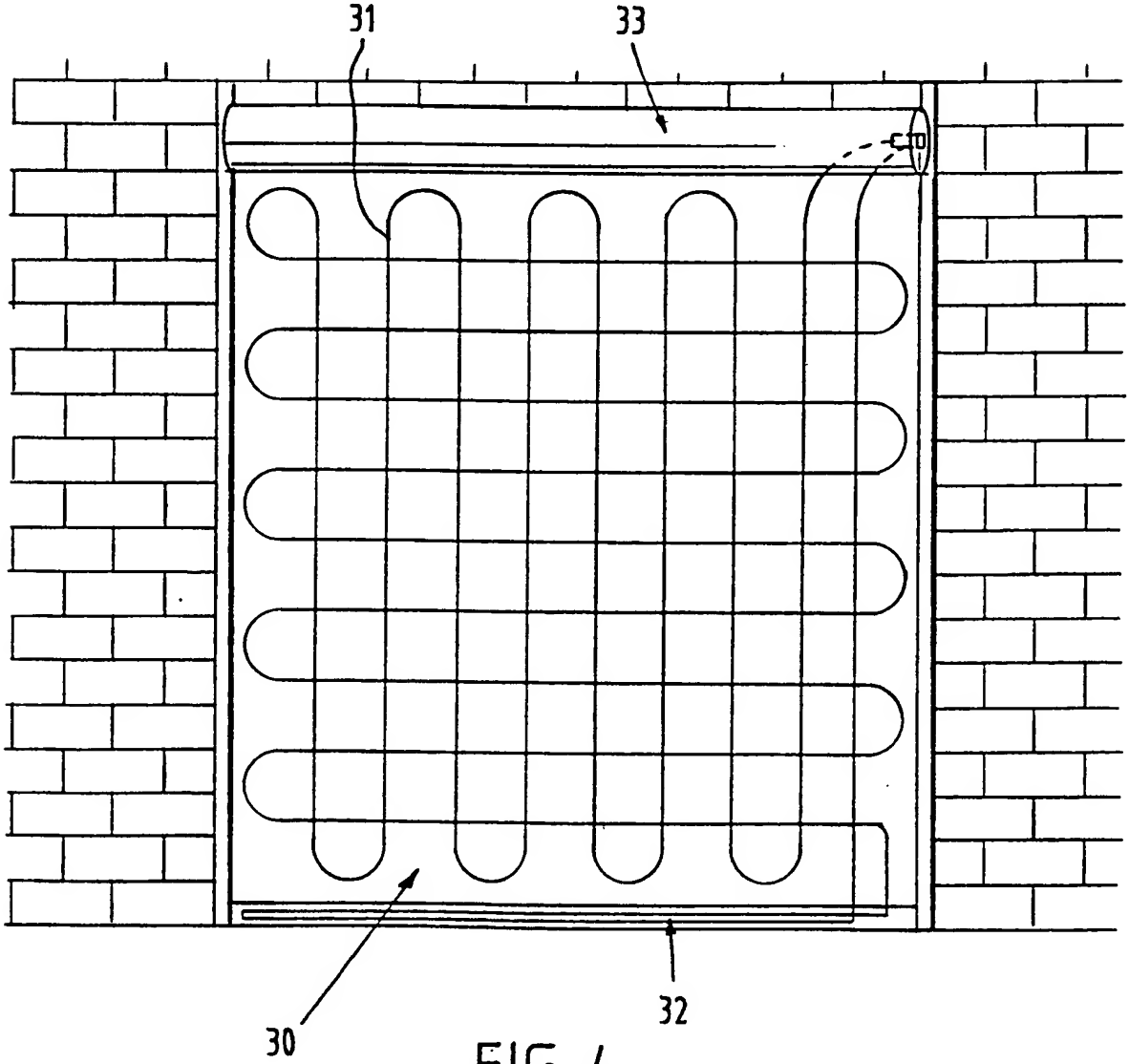

FIG. 4

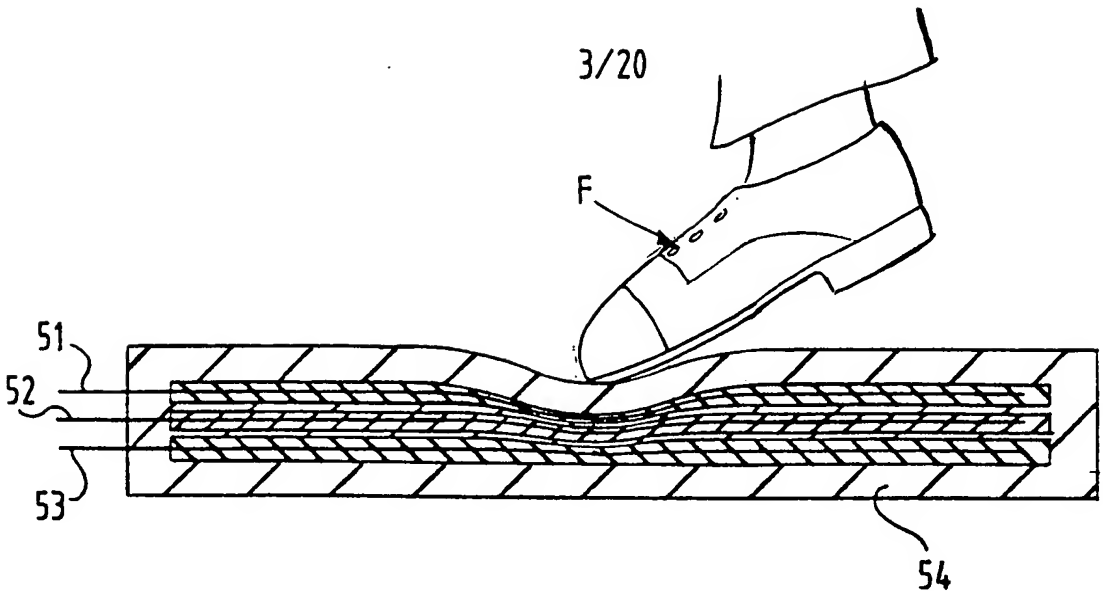

FIG. 5

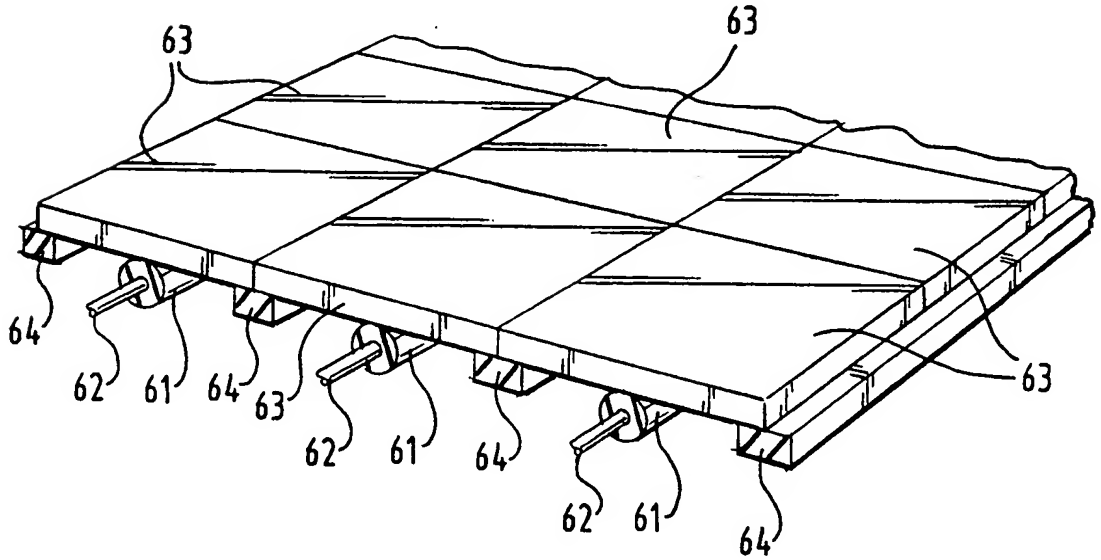

FIG. 6

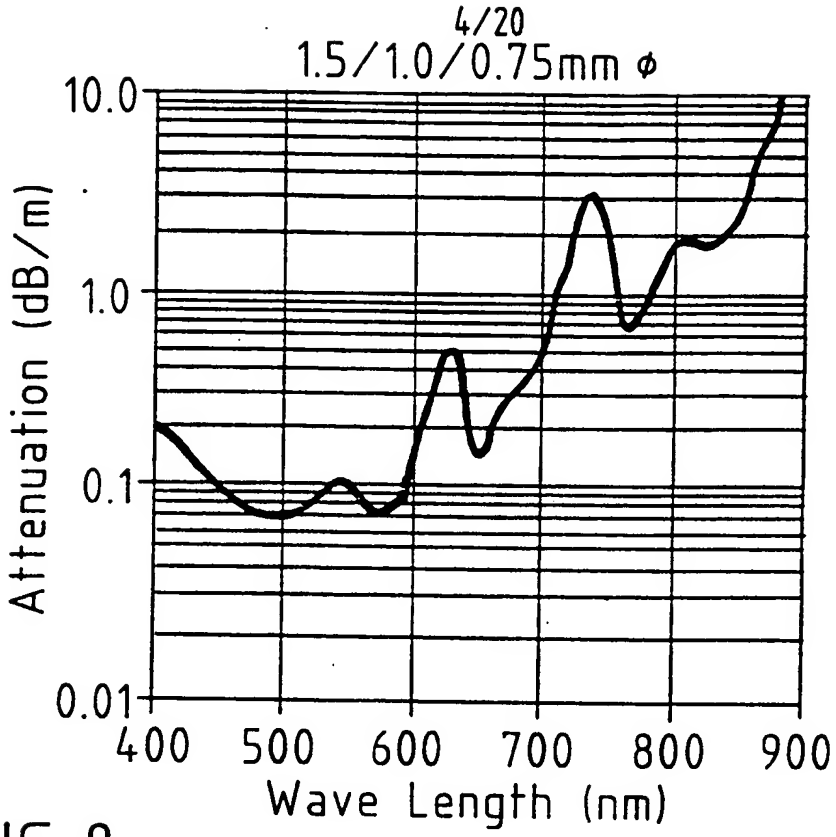
1.5/1.0/0.75mm φ
10.0
1.0
0.1
0.01
Attenuation (dB/m)
400
500
600
700
800
900
Wave Length (nm)

FIG. 8

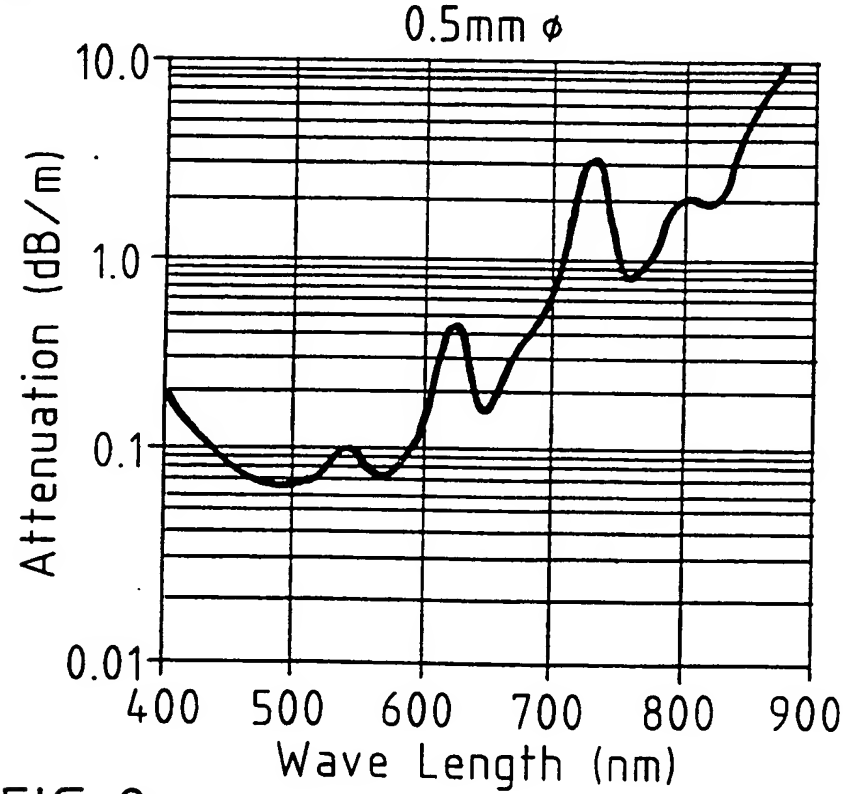
0.5mm φ
10.0
1.0
0.1
0.01
Attenuation (dB/m)
400
500
600
700
800
900
Wave Length (nm)

FIG. 9

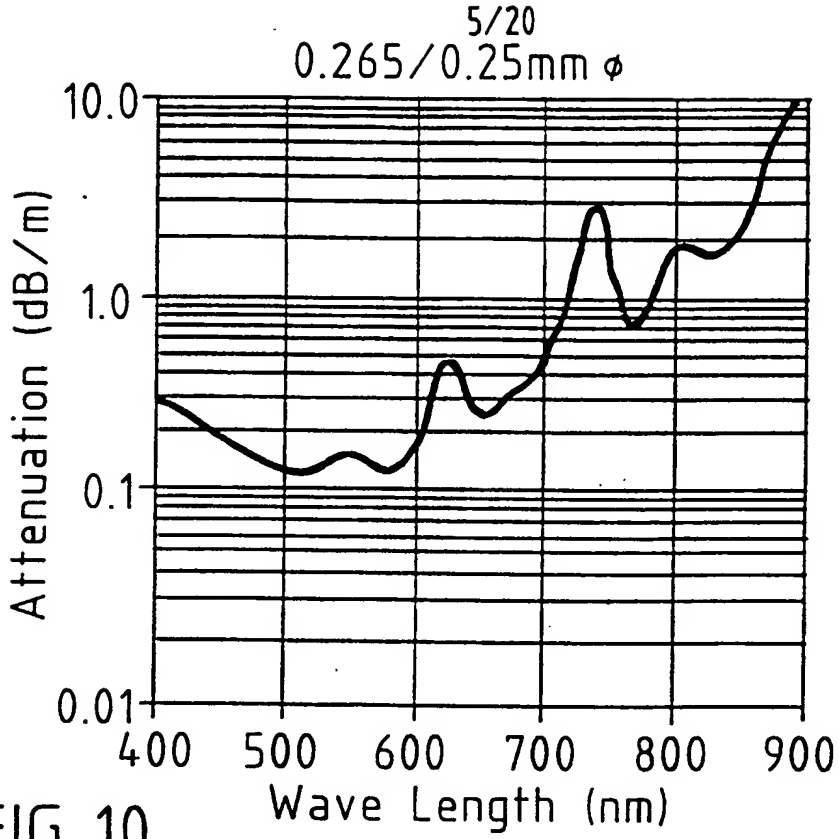
0.265/0.25mm φ
10.0
1.0
0.1
0.01
Attenuation (dB/m)
400
500
600
700
800
900
Wave Length (nm)

FIG. 10

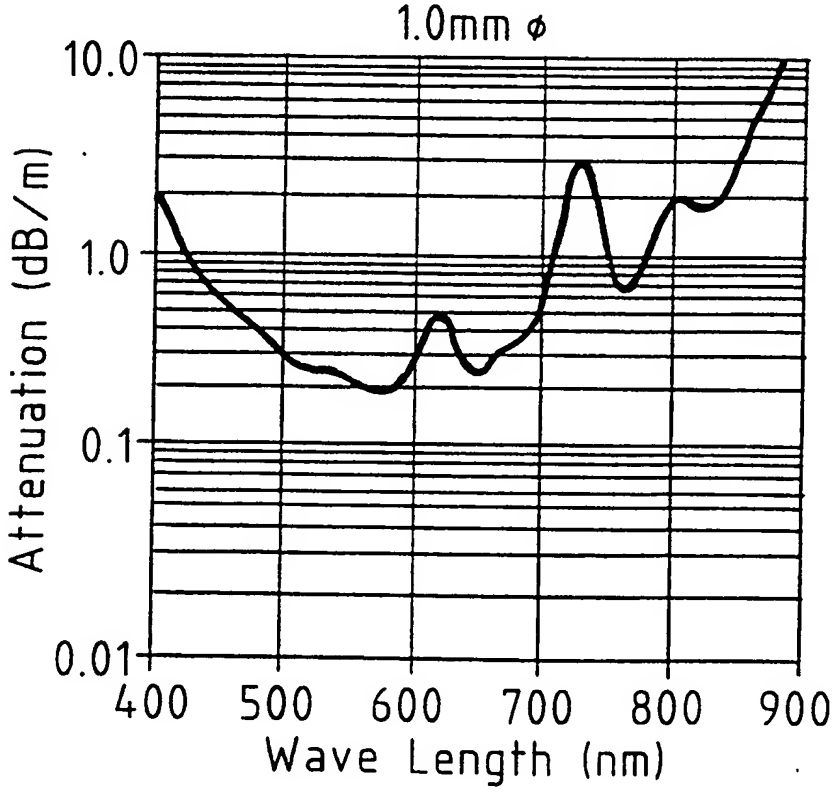
1.0mm φ
10.0
1.0
0.1
0.01
Attenuation (dB/m)
400
500
600
700
800
900
Wave Length (nm)

FIG. 11

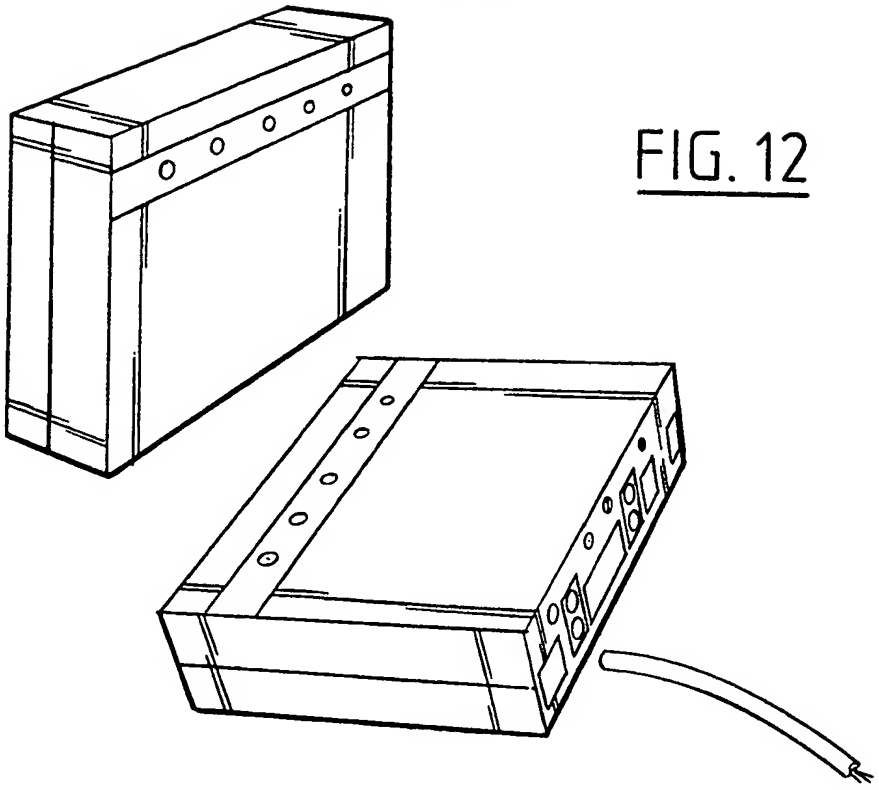

FIG. 12

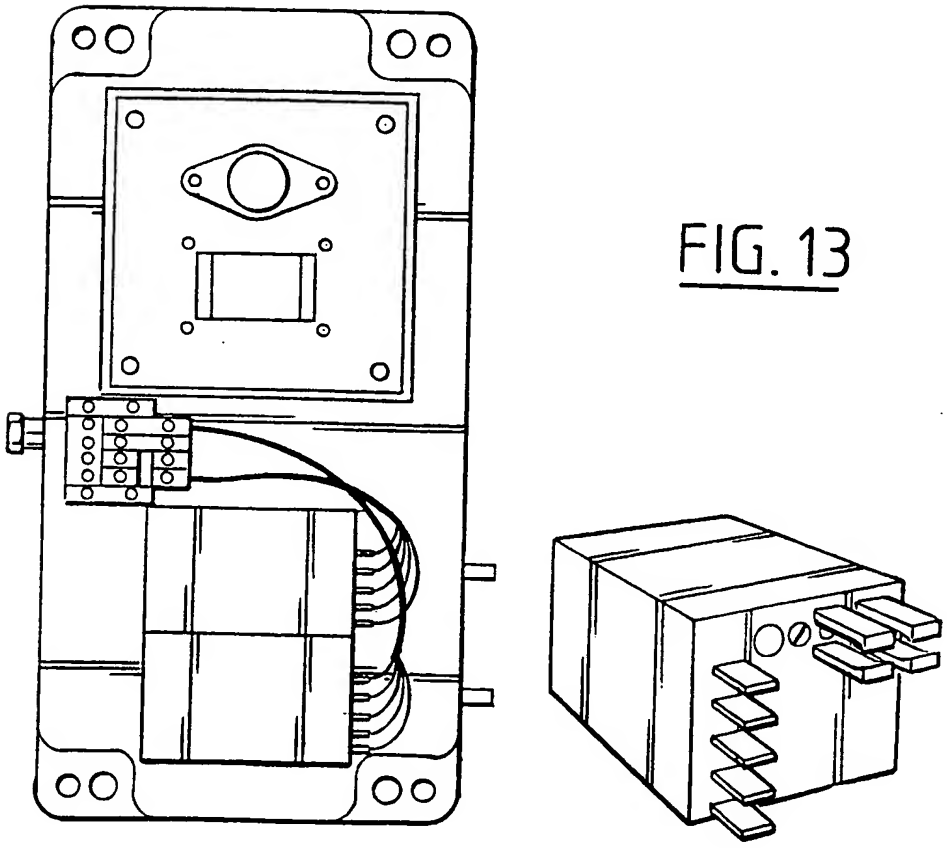

FIG. 13

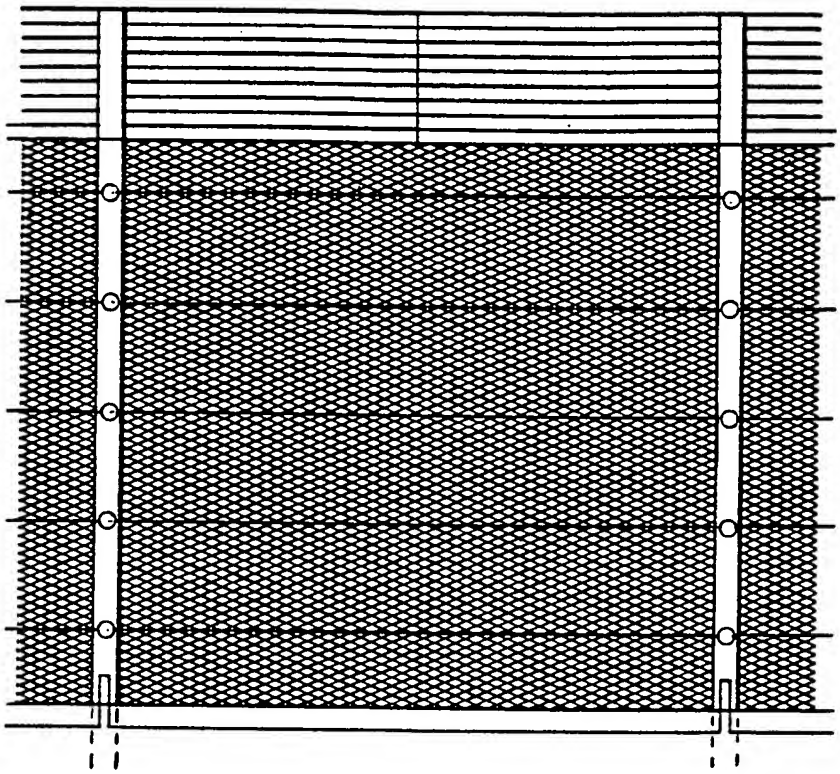

FIG. 14

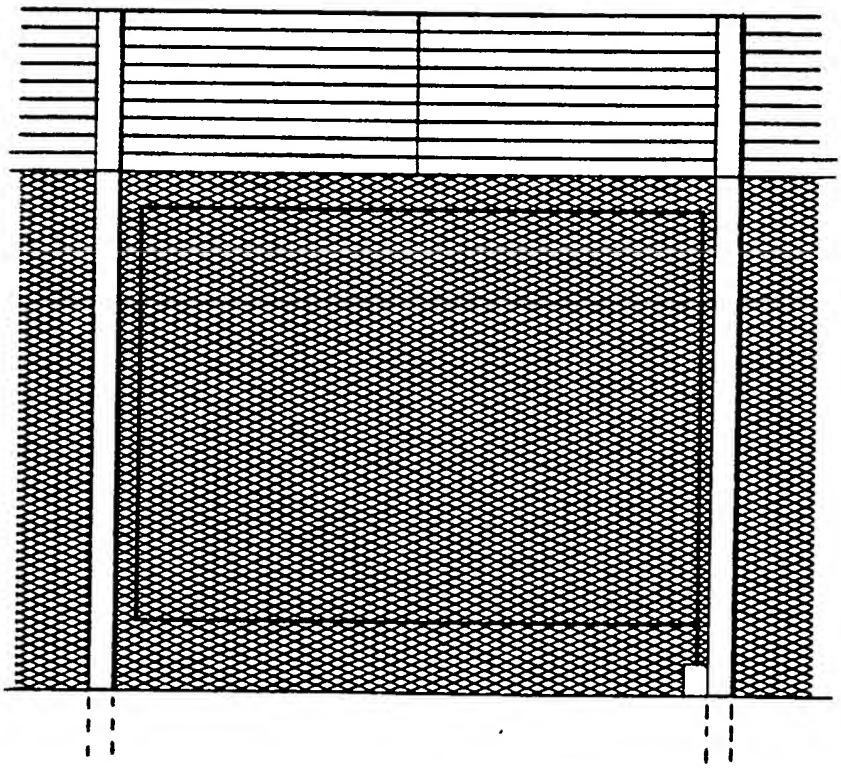

FIG. 15

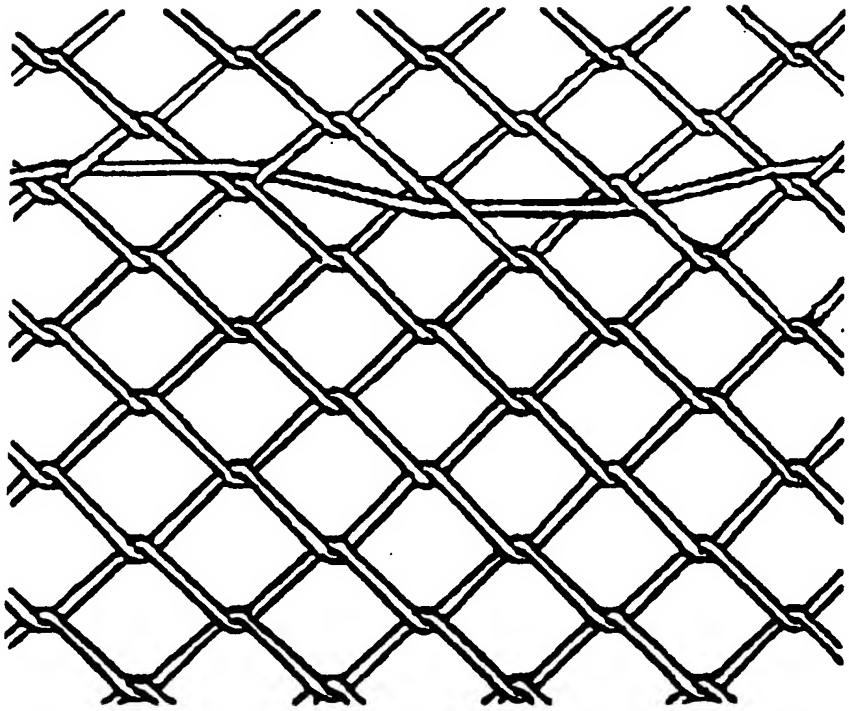

FIG. 16

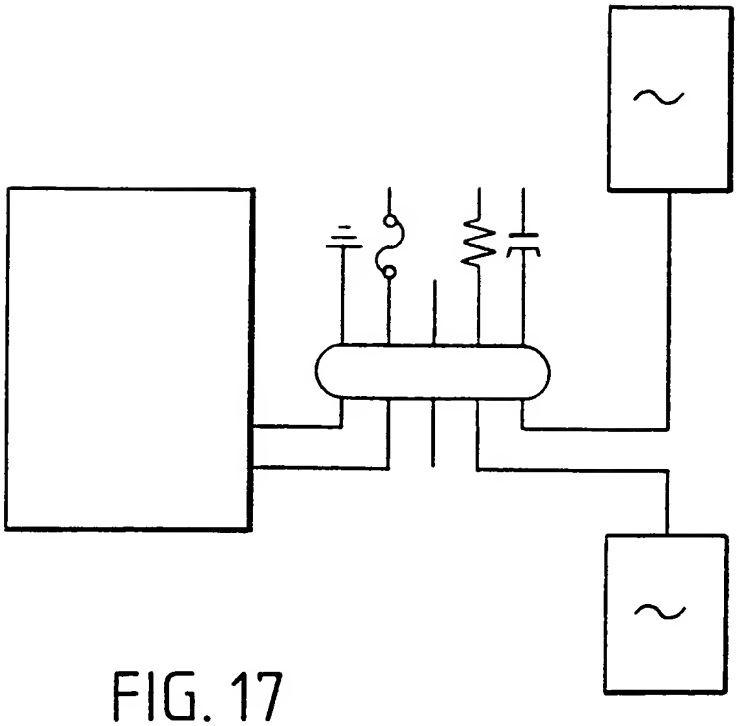

FIG. 17

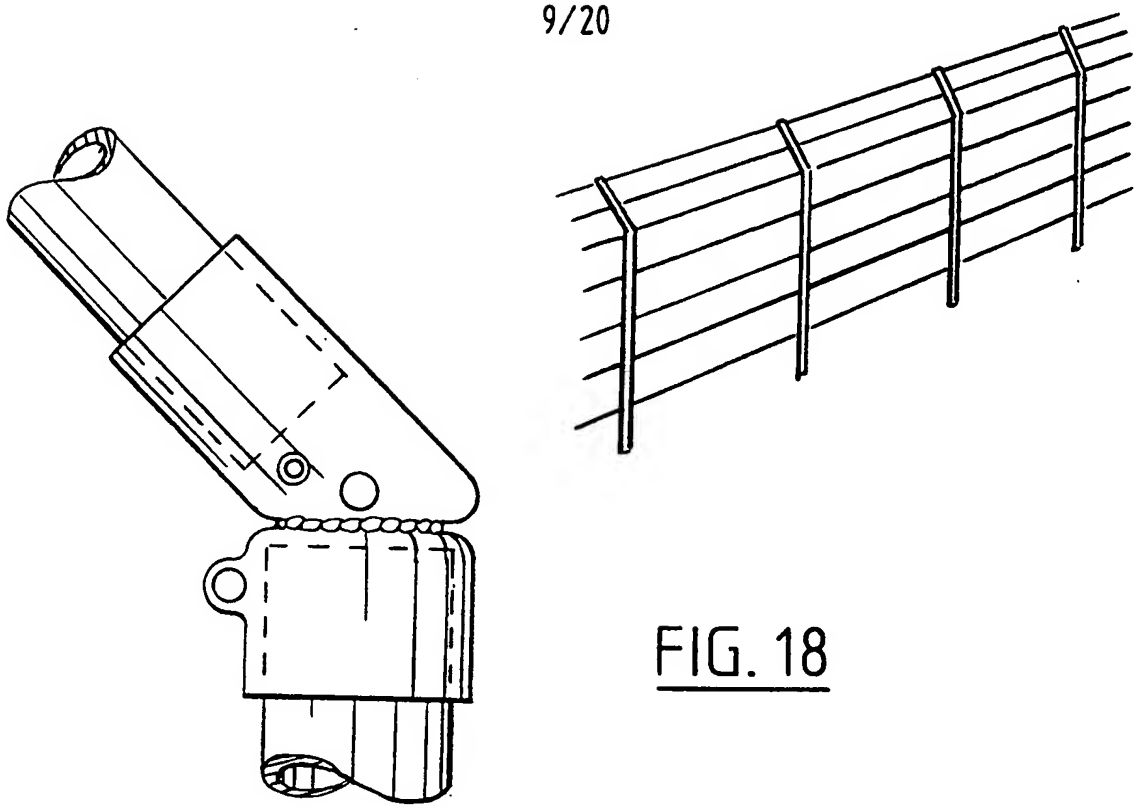

FIG. 18

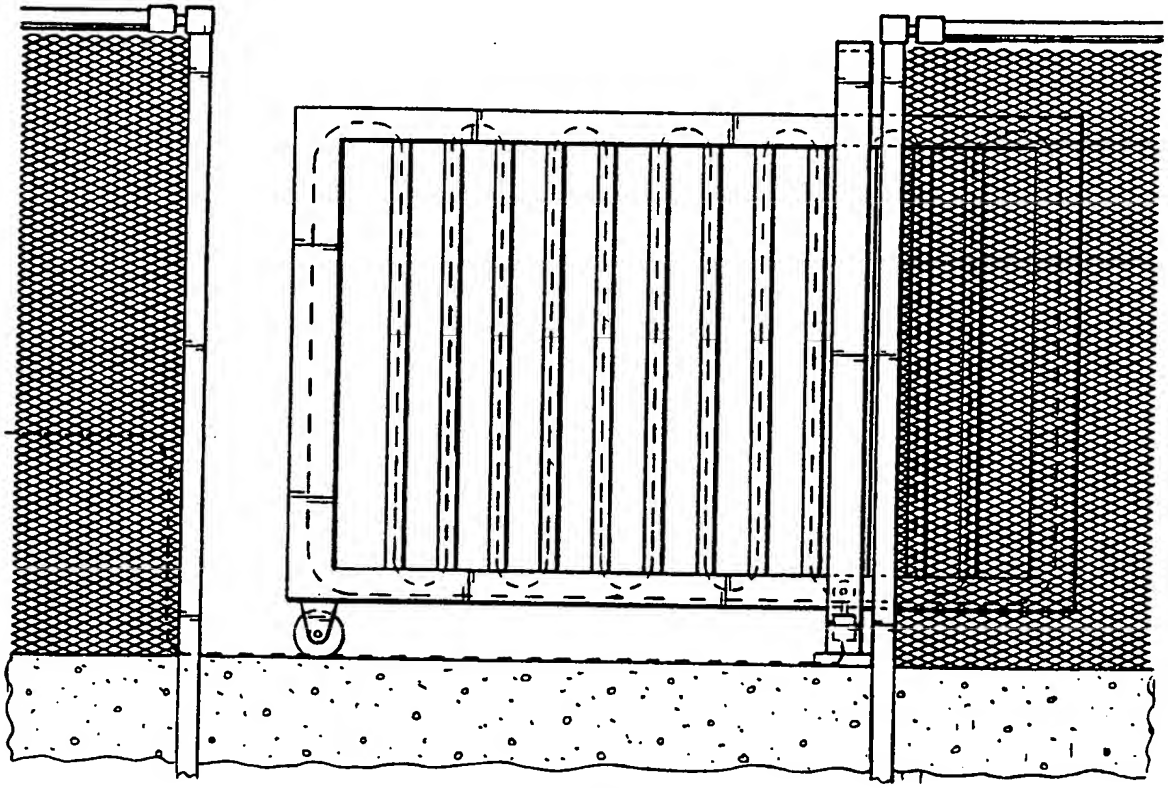

FIG. 19

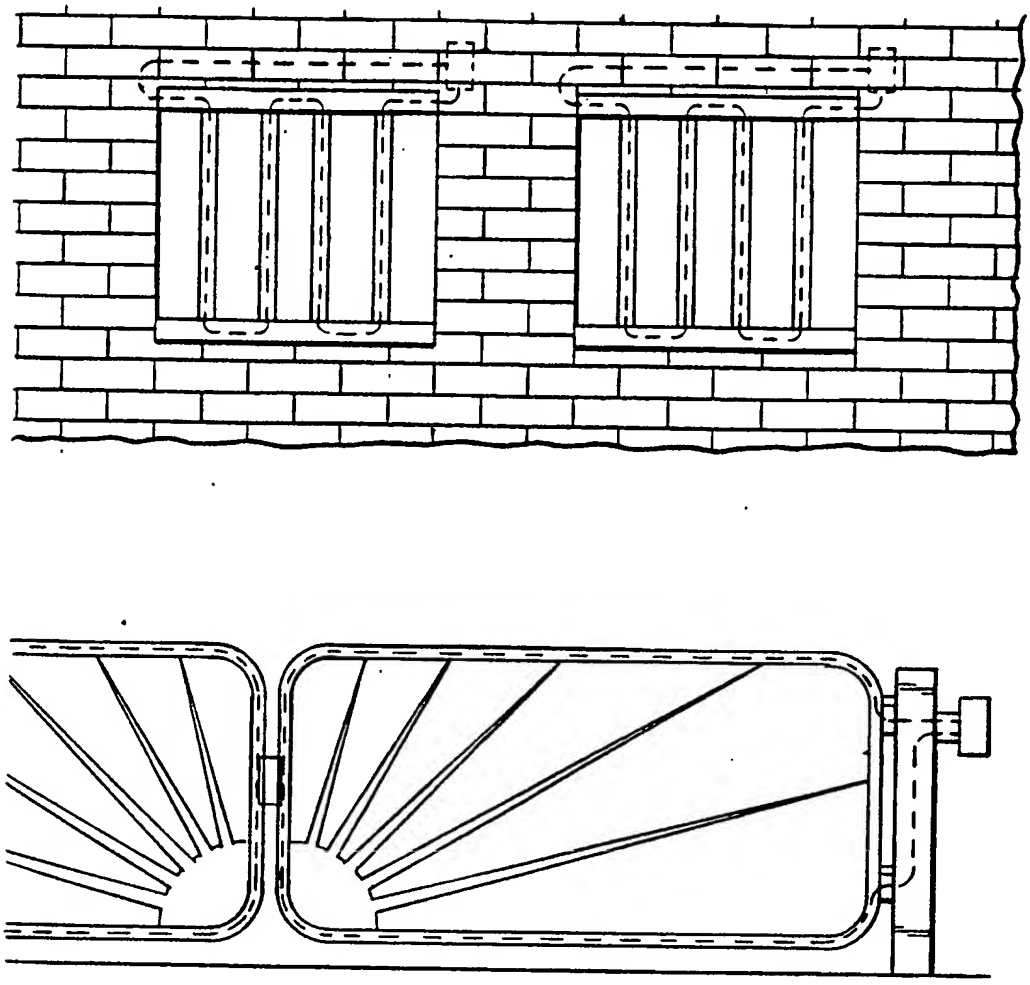

FIG. 20

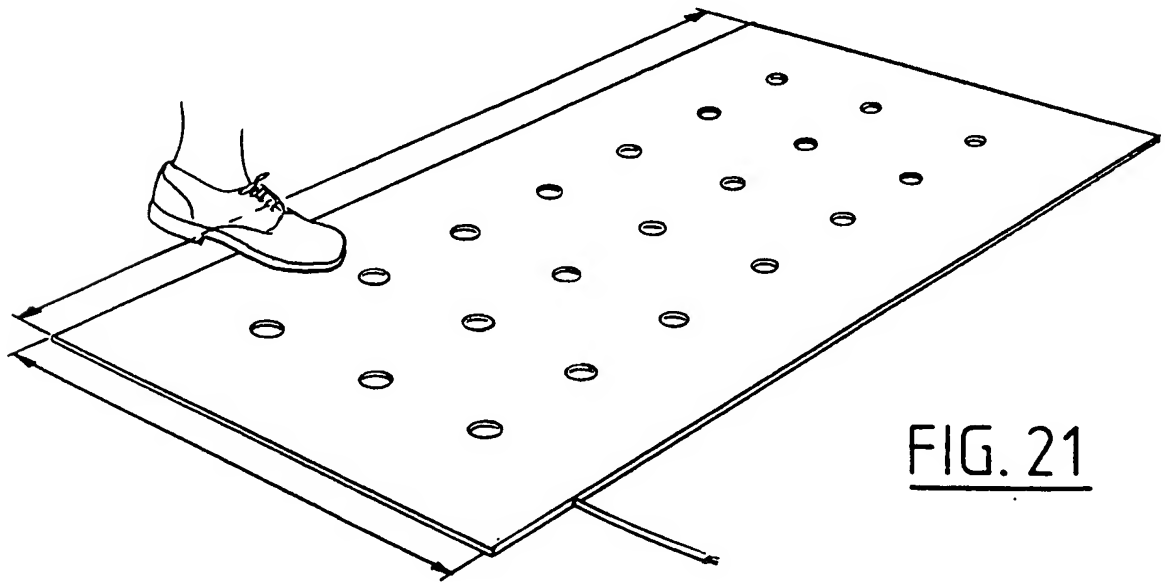

FIG. 21

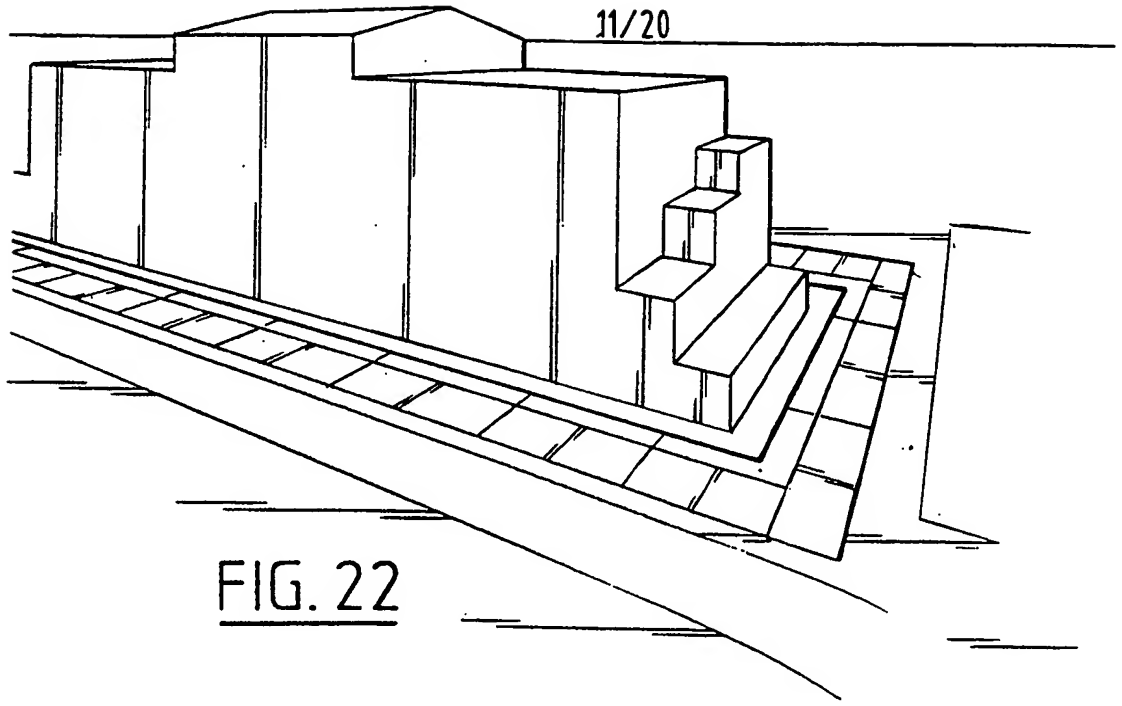

FIG. 22

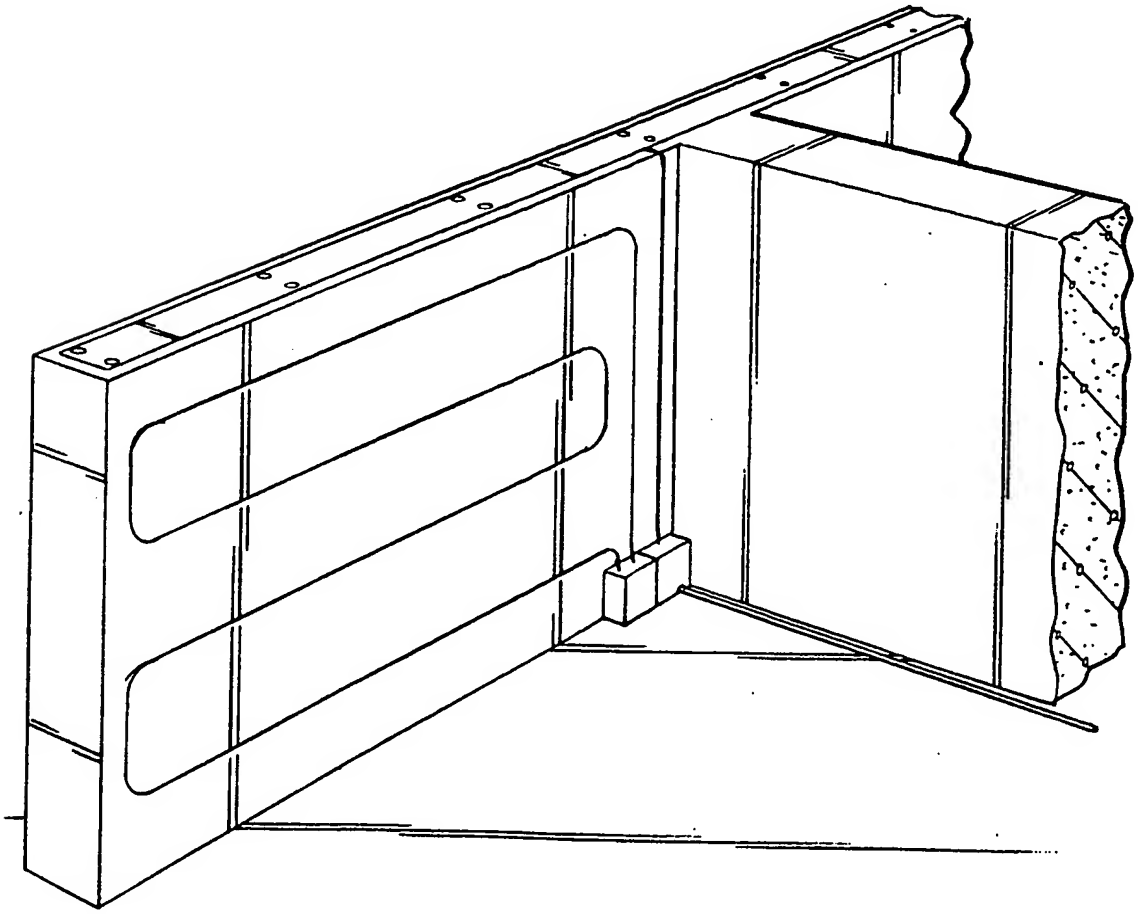

FIG. 23

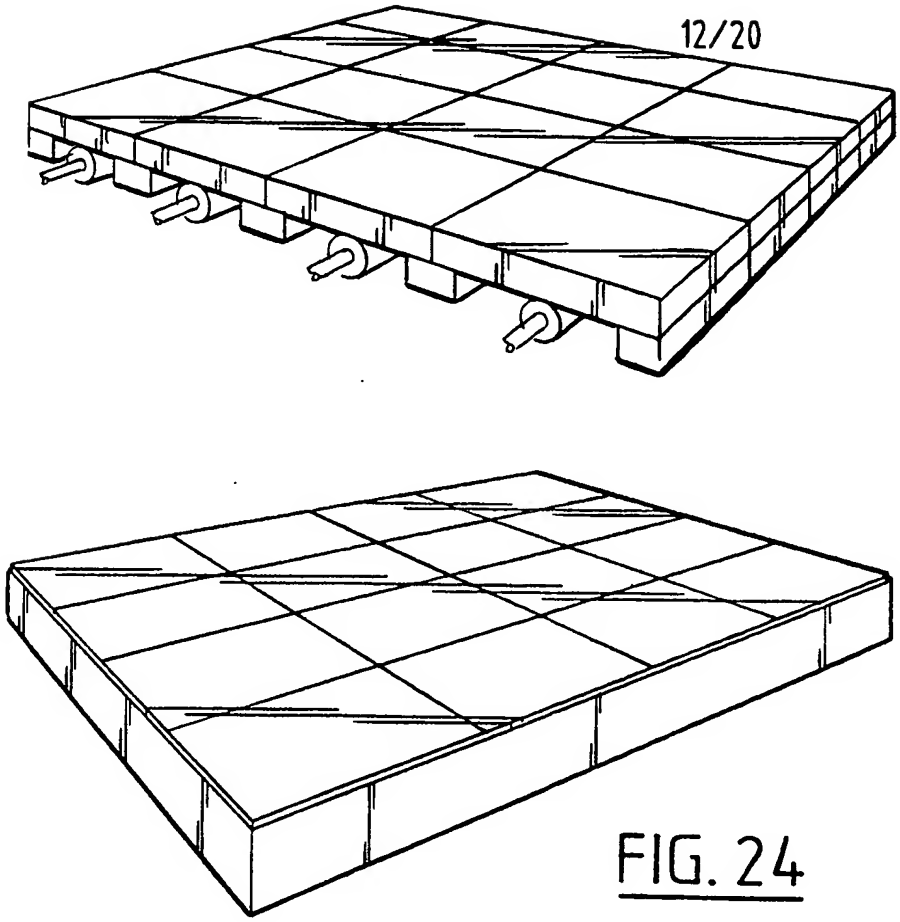

FIG. 24

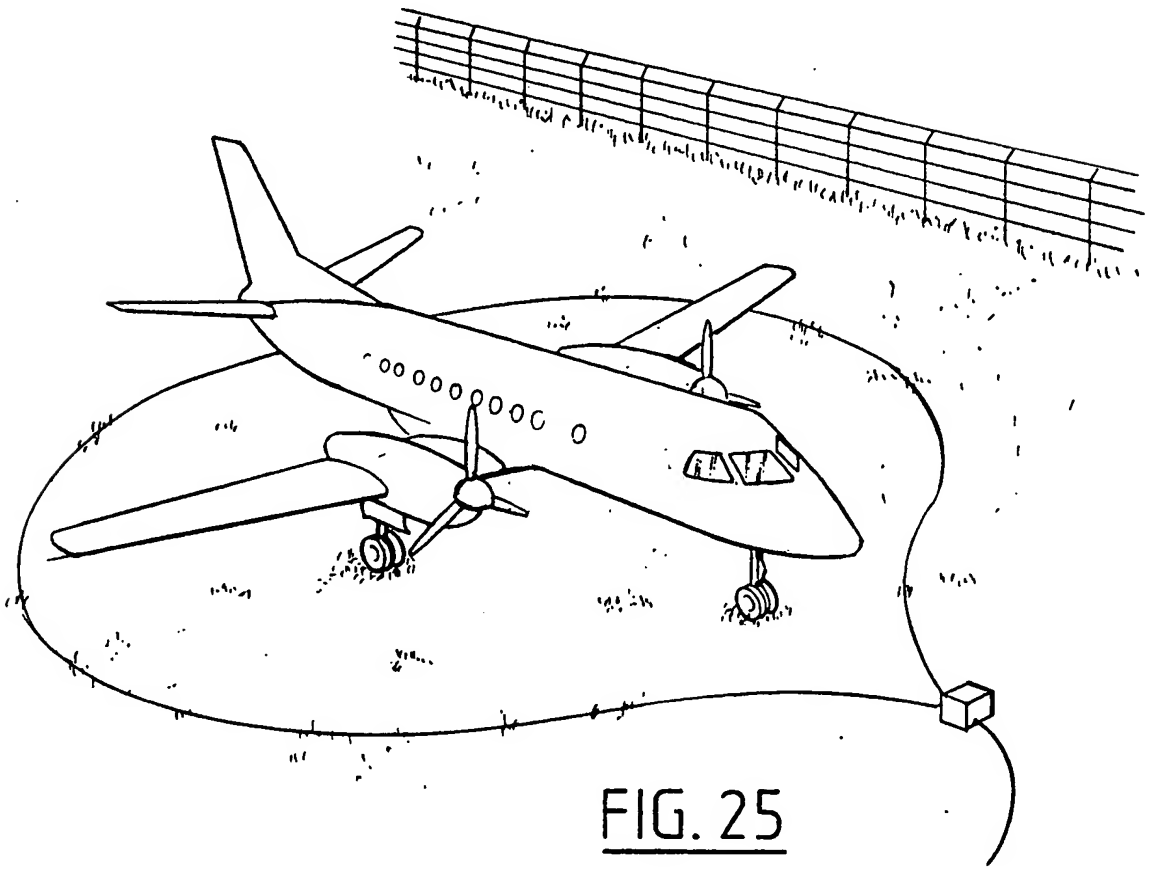

FIG. 25

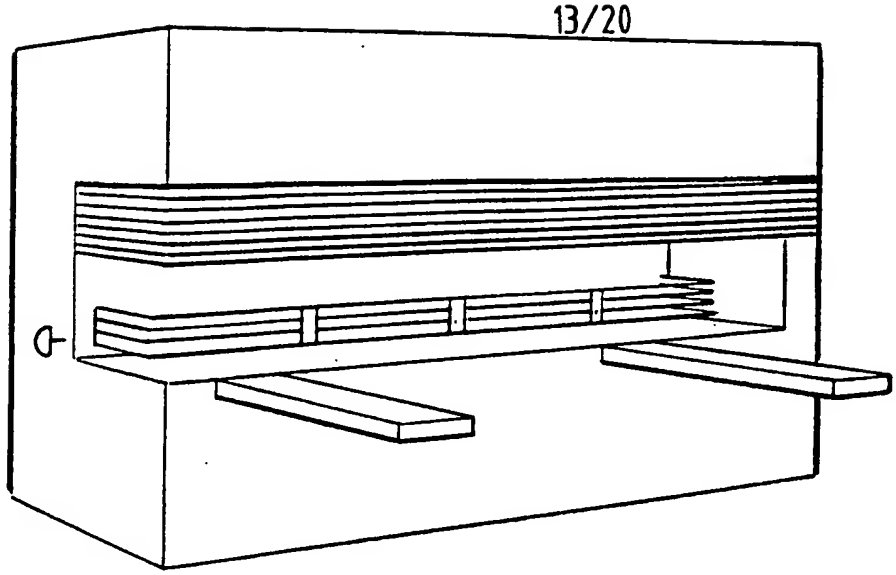

FIG. 26

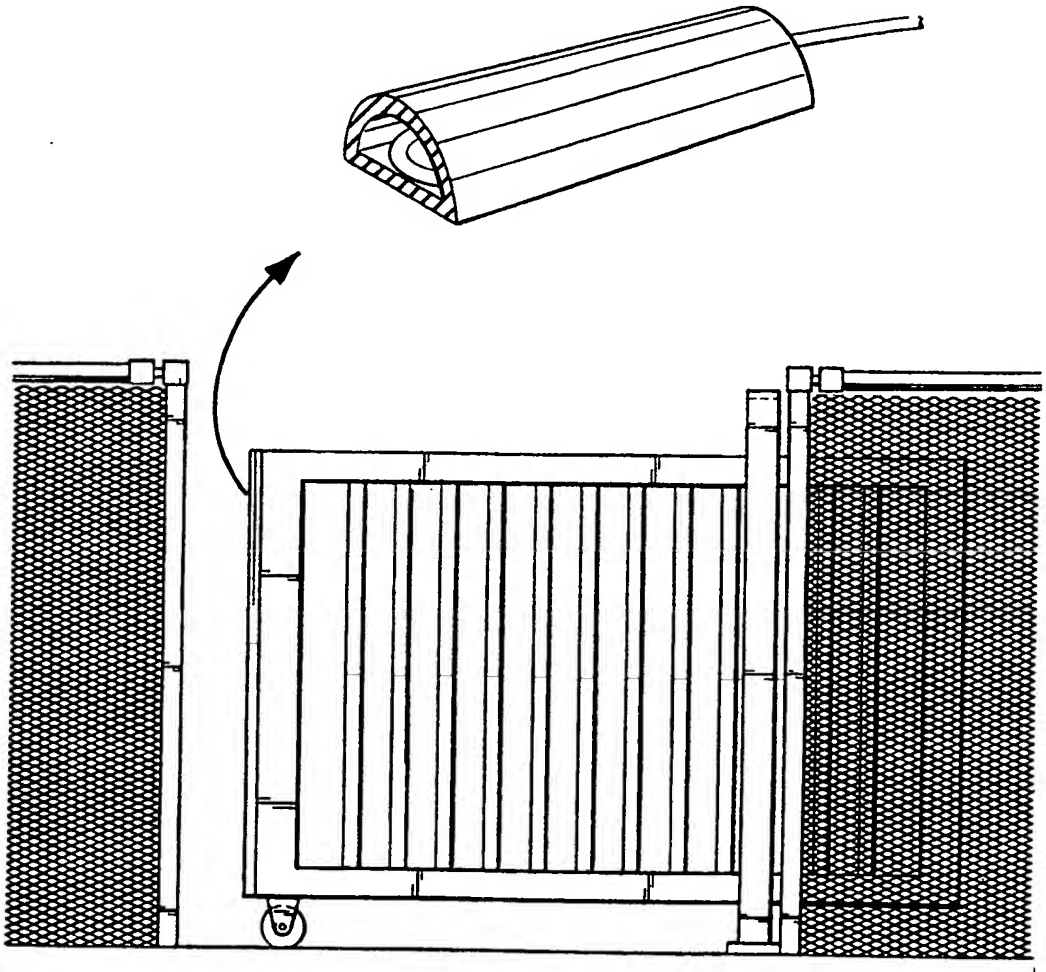

FIG. 27

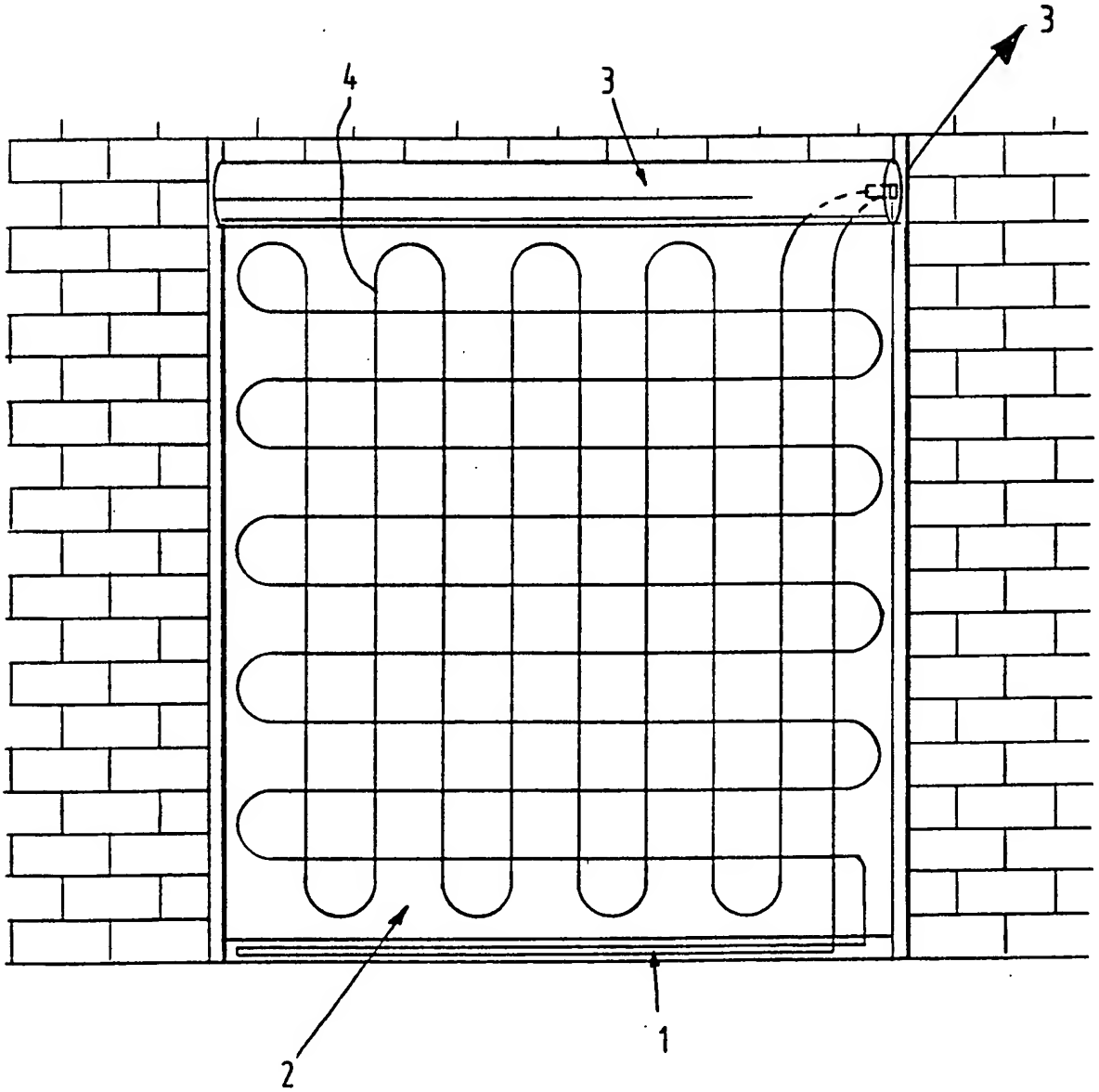

FIG. 28

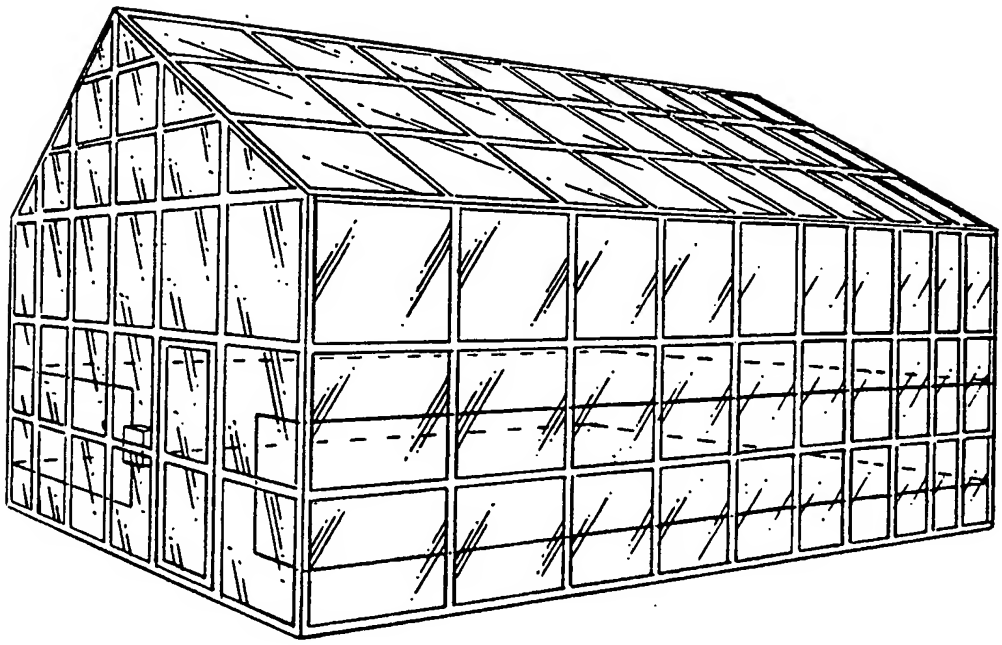

FIG. 29

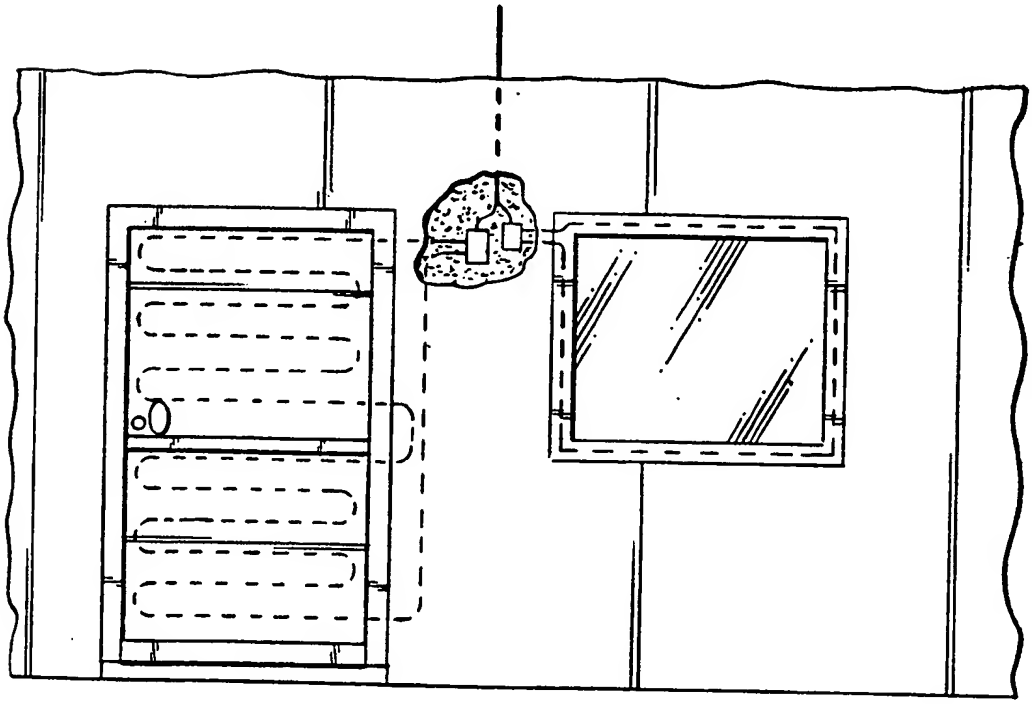

FIG. 30

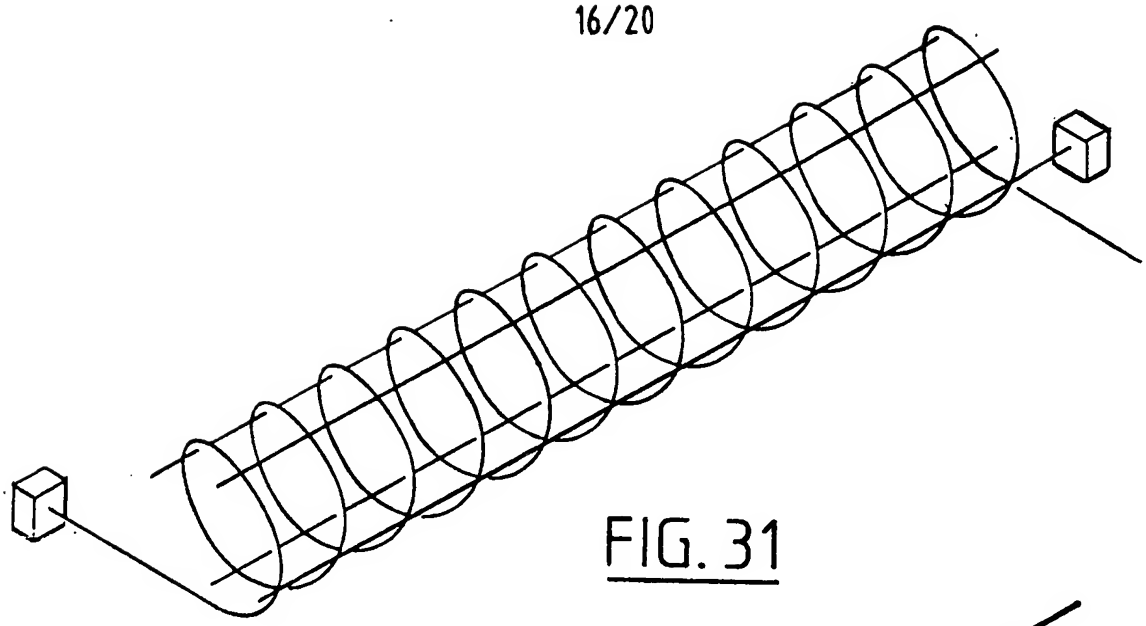

FIG. 31

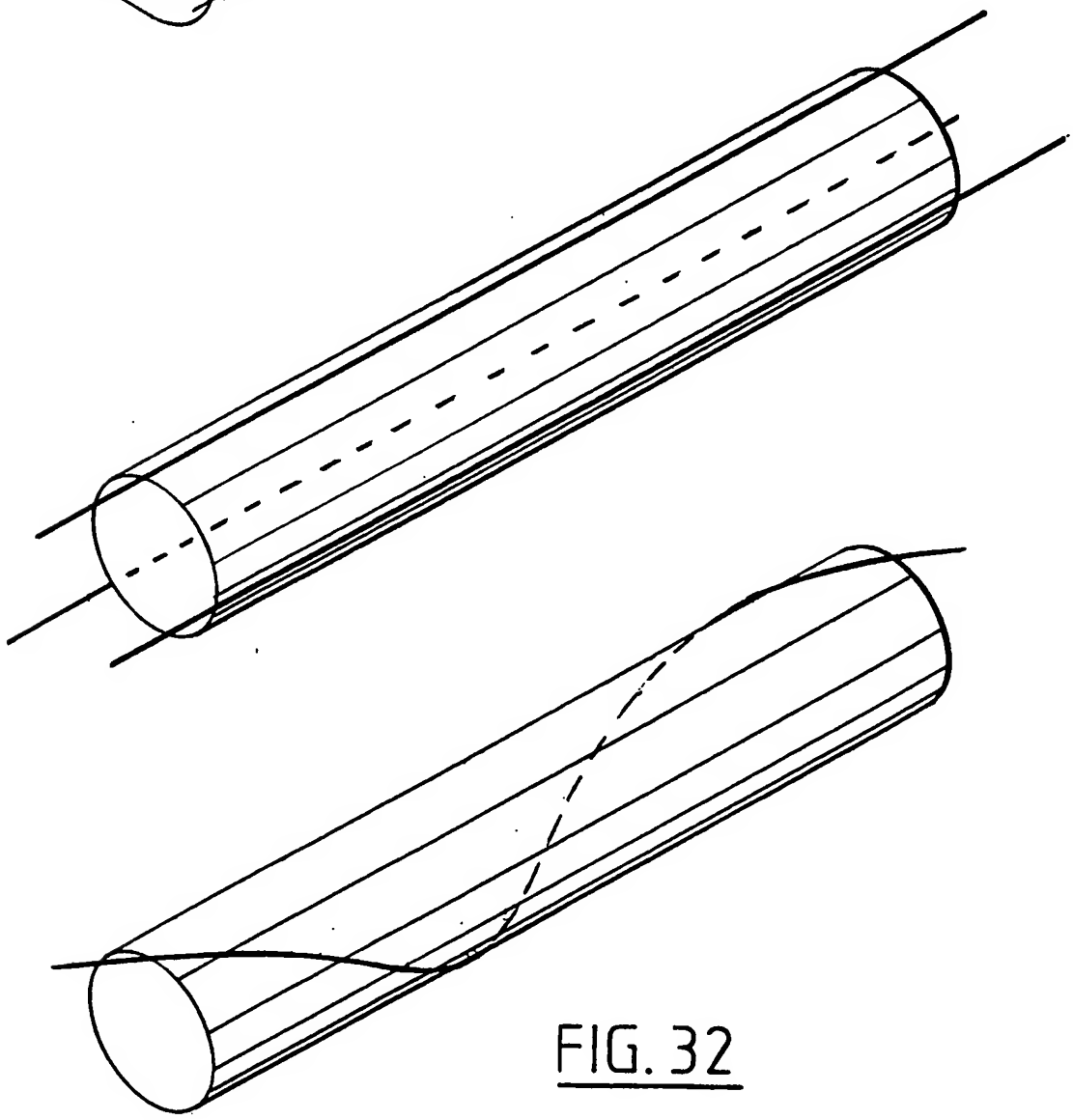

FIG. 32

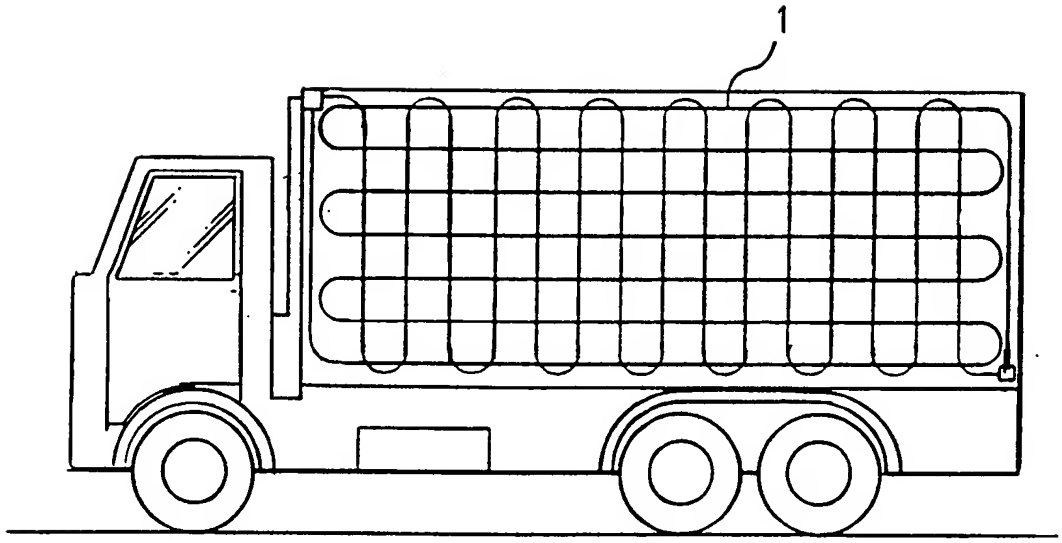

FIG. 33

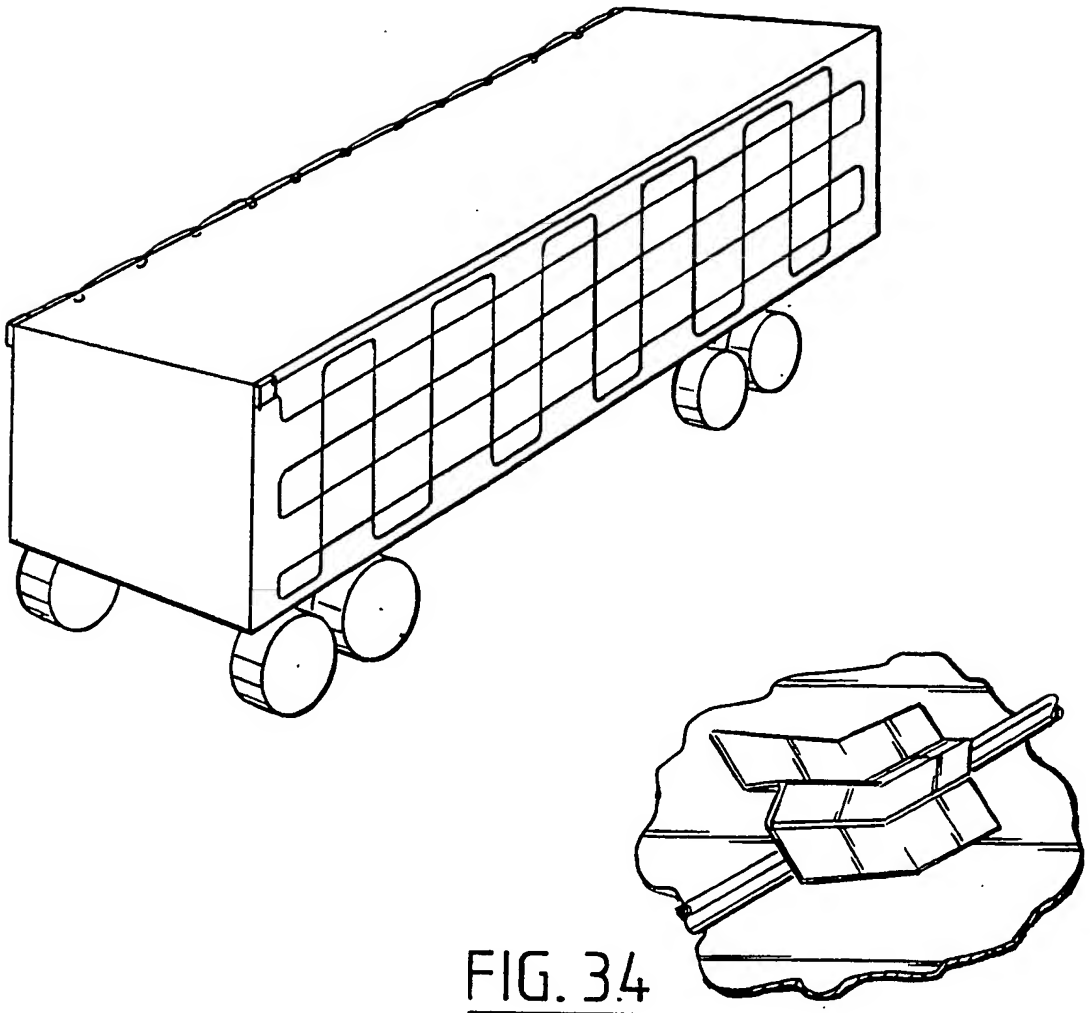

FIG. 34

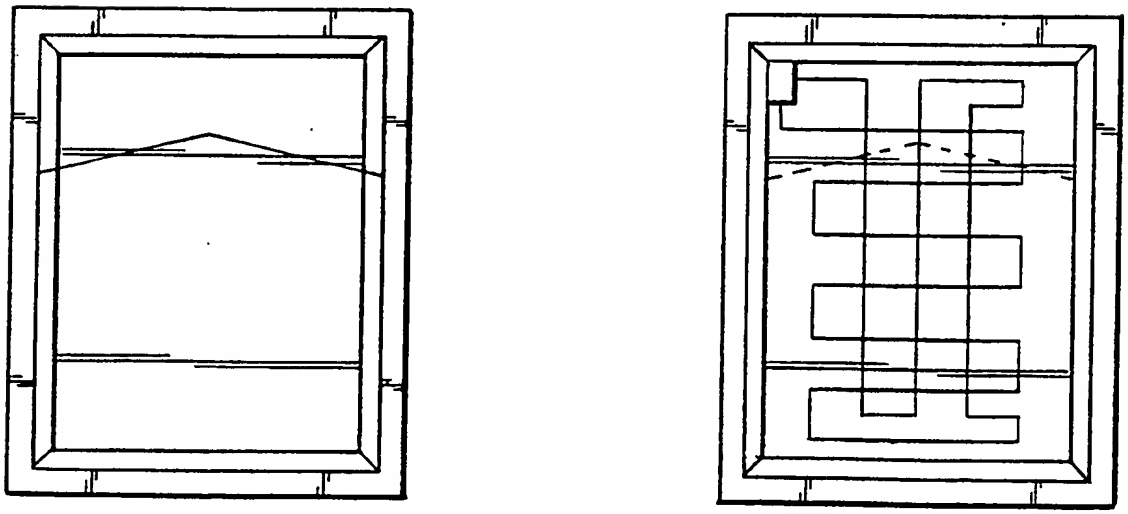

FIG. 35

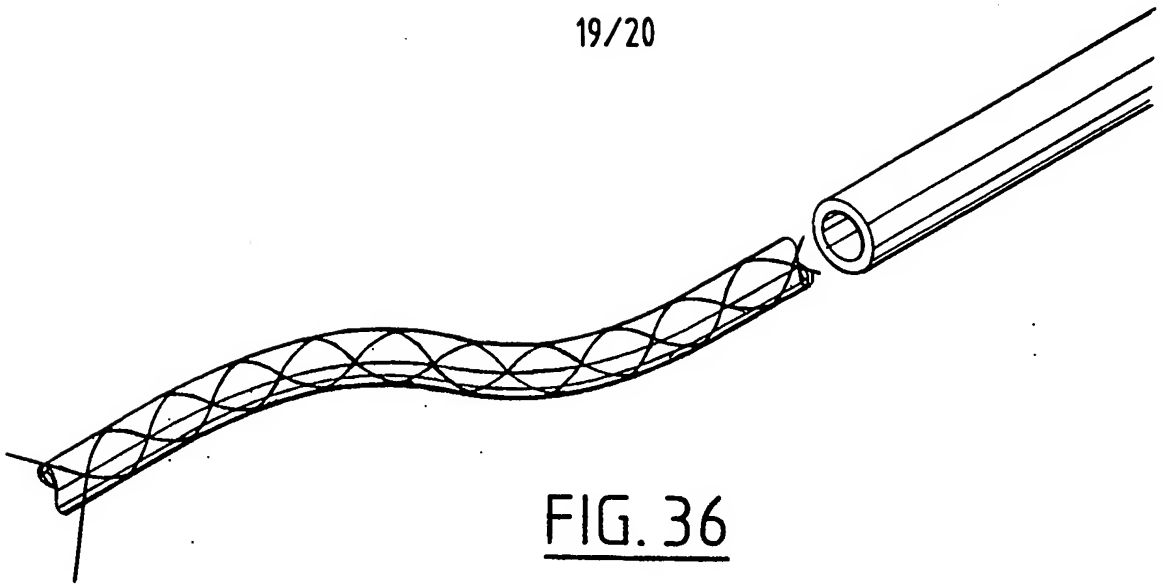

FIG. 36

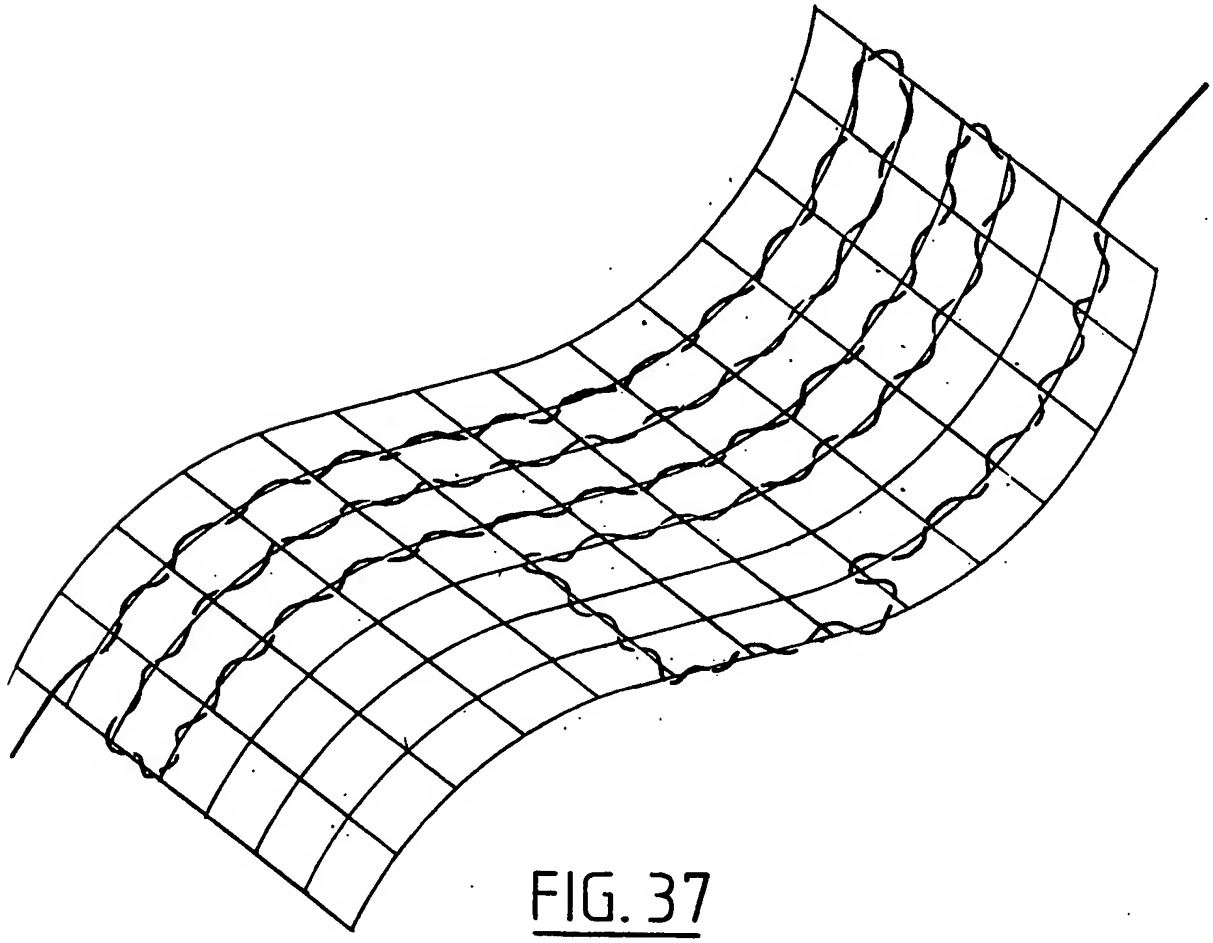

FIG. 37

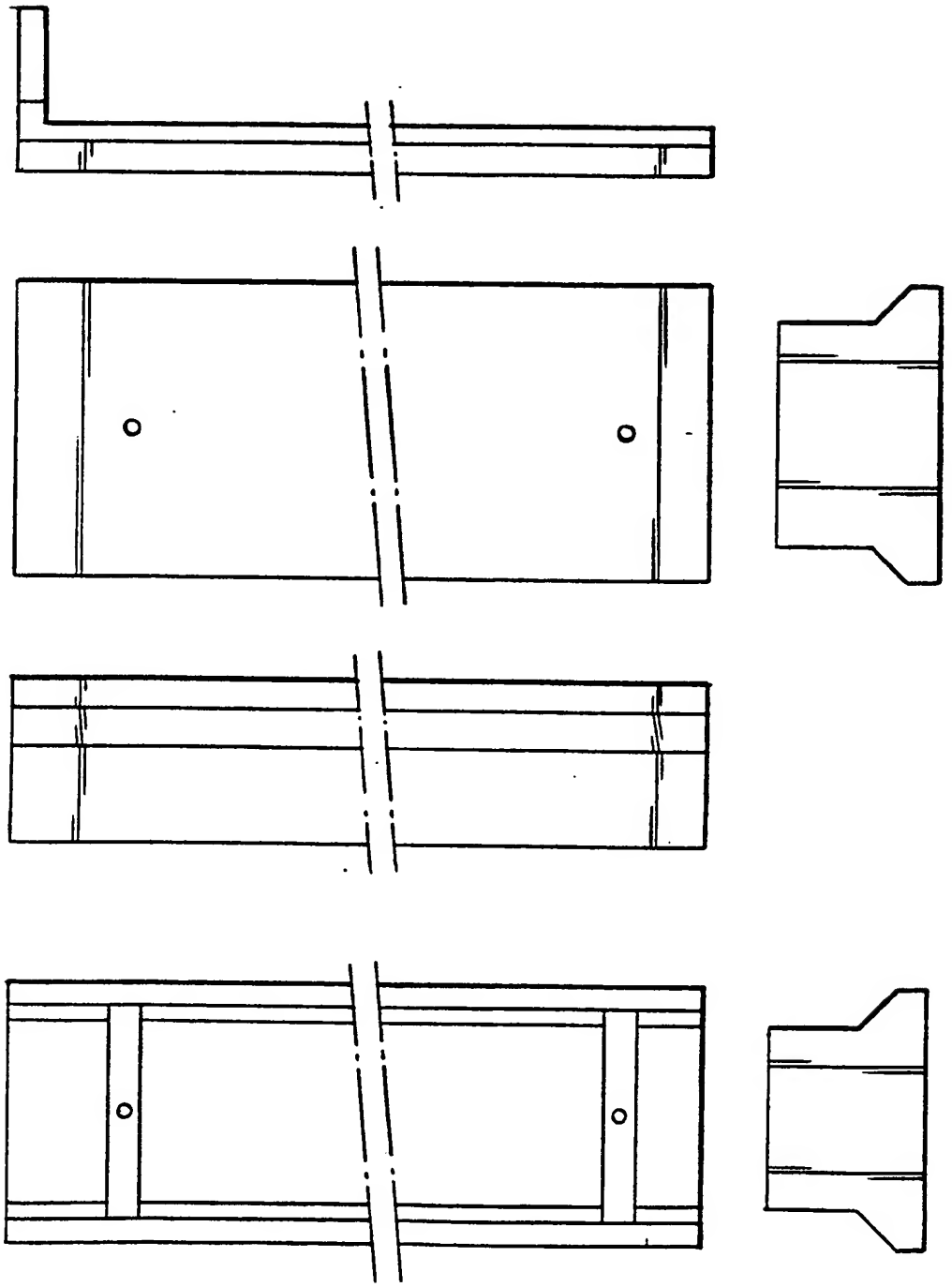

FIG. 38

INTERNATIONAL SEARCH REPORT

Inter nal Application No
PCT/NL 97/00693

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 G08B13/186

According to International Patent Classification(IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 G08B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 082 820 A (BATTELLE MEMORIAL INSTITUTE) 29 June 1983 see page 4, line 10 - line 31 see page 7, line 15 - line 29 see figures 1,7	1,3
X	DE 38 09 957 A (FELTEN & GUILLEAUME ENERGIETECHNIK) 5 October 1989 see the whole document	1,3,21
X	EP 0 049 979 A (PILKINGTON LIMITED) 21 April 1982 see page 9, line 19 - page 11, line 19; figures 1,2	1,2
A	GB 2 098 770 A (X-FACTOR ENTERPRISES) 24 November 1982 see abstract; figures 1-4	1,5-7, 24,27

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
17 April 1998	24/04/1998

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Sgura, S

Form PCT/ISA/210 (second sheet) (July 1992)

Inter onal Application No
PCT/NL 97/00693

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 134 386 A (A. SWANIC) 28 July 1992 see abstract; figures 1,2	1,8,19, 41
A	US 4 367 460 A (H. HODARA) 4 January 1983 see abstract; figures 1-10	1,9,30, 38
A	GB 2 193 825 A (CH. MOSS) 17 February 1988 see abstract	1,17
A	US 4 371 869 A (R. I. DAVIDSON) 1 February 1983 see abstract; figures 1-4B	1,18,28, 40
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